



PHYTOLOGIA

A cooperative nonprofit journal designed to expedite botanical publication

Vol. 45

February 1980

No. 1

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$11.00 in advance or \$12.00 after close of the volume; \$3.00 extra to all foreign addresses; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number; back volume prices will apply if payment is received after a volume is closed.

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THE SUBDIVISION OF ASCLEPIADACEAE

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Introduction

In 1809 Robert Brown separated a group of genera from the Apocyneae (= Apocynaceae) on the basis that they differed from the remainder of the family in possessing free styles, a gynostegium (i.e. the fusion product of the androecium and gynoecium or parts of them), pollen masses and the more or less common presence of an extra whorl of corona attached in various forms to the petals. He named this group the Asclepiadeae. Apart from these differences, the Apocyneae sensu stricto and the then newly emerging Asclepiadeae shared a multitude of attributes, viz. the regular, pentamerous, tetracylic, and hypogynous flowers, the almost universal presence of latex and the contorted imbrication of petals. Ever since, the Asclepiadeae grew in size to accommodate new genera and species, and their name was subsequently changed by Lindley (1853) to Asclepiadaceae R.Br.

The Asclepiadaceae were first classified by Decaisne (1844) into 5 tribes (Periploceae, Secamoneae, Asclepiadeae, Gonolobeae and Stapelieae) on the basis of pollen structure, with the first tribe having pollen in tetrads while all other 4 tribes are characterized by pollen masses or pollinia. The mechanism of pollen discharge differs also in the Periploceae (where the tetrads are received and dispersed by spatulate translators) than in the rest of the family (where the pollinia are attached to glandular secretions known as corpuscles from the 5 corners of the pentagonal stigma via non-cellular cords known as the caudicles or connectors). Decaisne's classification was later accepted in its entirety by subsequent taxonomists (e.g. Lindley 1853). However, the subdivision of Asclepiadaceae sensu Decaisne has undergone a number of alterations involving primarily the hierarchical status of each of the 5 tribes. While some authors (e.g. Schumann 1895, Rendle 1925, Melchior 1964) prefer to split them into only two subfamilies the Periplocoideae (= Decaisne's tribe Periploceae) and

Cynanchoideae (= the other 4 tribes), within the Asclepiadaceae s.l., Schlechter (1924) and most subsequent authors (e.g. Bullock 1957, Huber 1967, Dyer 1975) promote the former subfamily to family Periplocaceae, with only the Cananchoideae forming the Asclepiadaceae s.s. Genera of the latter group are then arranged into 2 subfamilies the Secamonoideae (with a pair of pollinia in each anther lobe) and the Cynanchoideae s.s. or Asclepiadoideae with only one pollinium in each anther lobe. Both opinions continue to gain advocates so that no general agreement among taxonomists regarding the circumscription of the Asclepiadaceae seems to prevail.

The Asclepiadaceae s.l. are a relatively large family with 250-320 genera and 1700-3000 species (see Rendle 1925, Willis 1931, Melchior 1964, Schill & Jäckel 1978), of which only about 45-50 genera and 200 species constitute the Periplocaceae while the rest fall in the Asclepiadaceae sensu stricto. A highly conservative estimate of the number of genera in the family is given by Airy Shaw (1973) as 130, but it has not been shared by any other taxonomic account of the family. The discrepancy concerning the number of genera and species reflects an unstable taxonomic situation within the family and it can easily be felt that both generic and specific concepts in the Asclepiadaceae are far from satisfactory. It is also noticeable that the distribution of the species among the genera is highly uneven. Thus all the genera listed by Airy Shaw (1973) have been surveyed together with their reported numbers of species and it has been found that there are no less than 123 mono-specific genera (i.e. 38.4 %), 118 genera (i.e. 37 %) each with 2-10 species, and only 16 genera (5 %) take in about 1800 species (i.e. approx. 60 % of all the species in the family).

In view of their unambiguous taxonomic boundaries, the Asclepiadaceae would have been expected to be among the more attractive targets for comprehensive taxonomic studies. On the contrary, the existence of only one main classificatory treatment of the family (with only superficial differences about hierarchical rank of the subordinate groupings) and its perpetuation in all textbooks and floristic works shows that the asclepiads are long due for a thorough taxonomic reappraisal, especially in view of the fact that numerous genera and species have been described after the publication of Schumann's (1895) scheme. Furthermore, owing to the probably erroneous belief that the Asclepiadaceae are of little or no economic importance, this family has been grossly neglected from various botanical standpoints for a long

time. This is clearly manifest in the fact that although this group is unique among angiosperms in their pollen structure and pollination mechanism, and that it was originally created and subdivided into smaller taxa because of their pollen peculiarities, they remained without a comprehensive study of their pollen morphology until attention has recently been drawn by El-Gazzar & Hamza (1973), and El-Gazzar, Hamza & Badawi (1974) to this obvious neglect of the family by palynologists. It is only when it became clear that the family has plenty to offer from the palynological standpoint that some interest has been in them by Schill & Jäckel (1978), whose efforts materialized in an excellent comparative account of various pollen morphological features of a relatively large sample of 408 species from 114 genera representing the *Asclepiadaceae sensu lato*. Nevertheless the wealth of information reported by Schill & Jäckel has not as yet been put to any practical use in establishing the taxonomic worth of existing classifications of the family. Other sources of phenotypic variation remain virtually untapped.

With the foregoing remarks in mind we have set out to investigate as many aspects of variation as can be observed in a large representative sample of genera and species, and to benefit from the recorded observations in (a) assessing the value of existing classifications, and (b) achieving a more meaningful arrangement of the genera which would cater for those described after the publication of Schumann's (1895) system. It should be pointed out that the scope of the present work has been limited only to the *Cynanchoideae* (by far the larger of the two subfamilies of *Asclepiadaceae sensu stricto*), and that a separate detailed study of the *Secamonoideae* is currently in progress.

General account of *Cynanchoideae*

The plants are generally small erect perennial herbs, herbaceous or woody twiners or scramblers, with a number of leafy or leafless succulent or cactus-like genera (e.g. *Caralluma*, *Hoodia*, *Huernia*, *Huerniopsis*, *Stapelia*, *Stapeliopsis*). The presence of latex is universal in the subfamily, and some species (especially from *Stapelia*) have an exceedingly foetid smell similar to that of rotten meat. The leaves are almost invariably simple and exstipulate, but may be opposite, whorled or rarely alternate. The flowers are usually arranged in dense dichasial cymes, racemes or umbels; partial inflorescences are mostly axillary and in acropetal succession along the stem although sometimes the plant carries only one

simple (often sessile) terminal umbel (as in some succulents, e.g. Caralluma, Boucerosia), or the flowers may be few, ebracteate and born singly on the cactus-like stem of some Stapelia, Hoodia, Huernia, Trichocaulon and Duvalia species.

The flower is constantly regular, pentamerous, tetra-cyclic, hermaphrodite and hypogynous. The calyx consists of 5 free imbricate sepals, which may be minute and indistinct (e.g. some Cynanchum spp.). The petals are 5, constantly united though to greatly variable degrees; the limbs range from much reduced to considerably longer than the tube. Petal limbs are contorted in bud, but after anthesis assume numerous shapes ranging between horizontally stellate (e.g. Stapelia), elongate to more or less filiform (e.g. Ceropegia, Araujia, Riocreuxia), and recurved triangular (e.g. Asclepias). The androecium consists of 5 stamens furnished with a staminal corona which takes almost as many shapes as there are species in the subfamily; hence its utmost identificatory value. The gynoecium is made up of 2 median superior carpels whose ovaries and styles are free, while the stigmas are united into a relatively large pentagonal body with or without a simple or conspicuously bifurcate apical appendage. Each locule contains a few to several multiseriate anatropous and pendulous ovules. The fruit consists of 2 separate follicles, each with a few-several flattened exalbuminous seeds with smooth or glossy pale yellow to brown testa and a distal tuft of silky white hairs. The outer surface of each follicle may be smooth, finely felty or provided with a number of hook-shaped soft outgrowths. The 5 staminal filaments are adnate to each other and to the style apex. Each anther consists of 2 unilocular anther-lobes and lies opposite to one side of the pentagonal stigma. At each of the 5 corners of the stigma a horny non-cellular secretion is produced and is known as the corpuscle (or corpusculum). It is attached to a pair of pollinia (via two non-cellular caudicles), each from one lobe of the 2 adjacent anthers. Therefore, although each of the 2 pollinia attached to the same corpuscle belongs to a different anther, they are both morphologically identical and are released from their respective thecae simultaneously and have been termed "twin pollinia" by El-Gazzar & Hamza (1973); a term later adopted by Schill & Jäckel (1978). Each corpuscle with 2 caudicles and a pair of twin pollinia is generally known as the pollinial apparatus.

The development of pollinial apparatus in the Asclepiadaceae is a floral modification to facilitate as well as ensure both cross-fertilization and entomophily. Thus

a visiting insect rests on the glandular or slippery surface of the stigma and attempts to reach down for the nectar, its legs fall between the anthers and in trying to retrieve them they detach the corpuscles from the stigma. The twin pollinia are thus released from their thecae together with the corpuscles through the agency of the caudicles. The same insect transfers its load of pollinial apparatus to another flower, and keeps exchanging pollinia between various flowers of the same species. The pollen tubes from the same pollinium all enter one of the two ovaries in the flower (Frey 1902). We have not been able to find any detailed account of the insects aiding in the pollination of asclepiads, and the question whether there is any specificity between insect and plant species or genera and the factors governing such insect-plant relationship (if any) remains unresolved. However, according to Knuth (1898) the insect pollinators of the following genera are:

Asclepias: flies ("Fliegen"), bees ("Bienen"), wasps ("Wespen"), tomb-wasps ("Grab-wespen").

Araujia: large bees ("grosser Bienen").

Stephanotis: long-trunked moths ("lang-russeliger Schwärmer").

Stapelia: carrion-flies ("Aasfliegen").

Ceropegia: small flies ("kleine Fliegen").

Modifications in the flower to suite insect pollination seem limitless and involve other whorls as well. The accessory organs (such as staminal and corollary corona) and the presence of pollinia in the upper or lower parts of the anther-lobes are among such modifications.

According to Good (1952) the *Asclepiadaceae* are found throughout the tropics and over a considerable part of the warmer temperate regions, with a notable exception that they are absent from much of the Pacific including the Hawaiian Islands. In North America they are throughout the United States and enter Southern Canada on a wide front, reaching at one point a latitude of nearly 60° N. In the northern Old World they are absent from the Azores and from the British Isles, but occur throughout the rest of Europe, except for a few small coastal areas, as far north as latitude 61° N in southern Finland. In the southern hemisphere the boundary runs obliquely across South America to a latitude short of 50° S, includes all Africa, and virtually all Australia, though not Tasmania and New Zealand. Some adventive species such as Asclepias curassavica, Gomphocarpus fruticosus and Calotropis procera are found in nearly all warmer parts of the world, including some areas where the family is not native. The proportion of narrowly distributed or

endemic genera is very high and some are very local. The proportion of narrowly distributed or endemic species is even higher and there is no species common to both worlds. The areas of greatest relative species concentration are first and foremost South Africa, and to a lesser degree the Madagascar region and Malaysia. Although Good offered no explanation for the peculiar phenomena of total absence of asclepiads from most islands and the very high incidence of narrowly distributed or endemic genera and species, it seems that the spreading of such plants is highly dependent on the presence of a specific insect or group of insects for pollination which may be highly localized or may not find it easily palatable to inhabit most islands with their predominantly severe environmental conditions.

For over 160 years the work on pollen morphology in the Asclepiadaceae was confined to brief descriptions and inadequate illustrations of the pollen apparatus in a few individual species by Frye (1901), Volk (1949), and Dassanayaka & Jayasuriya (1974). The work of Huang (1970) on some Formosan species deserves a special mention here as it incorporates a number of basic and clear errors. Thus despite the universal belief that the Cynanchoideae are definable by the presence of pollinia attached in pairs to stigmatic corpuscles through non-cellular caudicles, Huang described the pollen of 3 of the 7 species studied by him (Cynanchum formosanum, Hoya carnosa and Stephanotis mucronata) as 3(-6) porate or colpate monads, and of the rest as "polyads", with no mention of pollinia, caudicles or corpuscles in any of them. Furthermore, the dimensions given by Huang for the "polyads" of the remaining 4 species (Gymnema alternifolia, Marsdenia tomentosa, Tylophora breviper, Wattakaka volubilis) are at variance with those given for the same species by El-Gazzar & Hamza (1973), El-Gazzar et al (1974) and Schill & Jäckel (1978). Under the circumstances, one cannot help feeling that Huang might have gone astray with the identification of the specimens available to him, or that Formosan asclepiads are yet to be thoroughly revised.

The lack of interest in the Asclepiadaceae is further exemplified by the small fraction of genera and species studied cytologically. According to Cave (1956-1964), Fedorov (1969), Ornduff (1967, 1968) and Moore (1973-1977), chromosome numbers have been reported for only 46 genera and slightly more than 200 species (ca. 6.6 % of the total in the family). This may be attributable, at least in part, to the fact that the family is cytologically almost entirely homogeneous, with nearly all the

species studied so far having chromosomes in multiples of 11, with a few dubious records of $2n = 24$.

Similarly, little is so far known about the embryology of the plants. The micro- and macro-sporogenesis, including embryo sac and endosperm development, in *Asclepias* were dealt with by Gager (1902), and in *Calotropis procera* by Sabet (1931). Another detailed study of 8 *Asclepias* species and 2 *Acerates* species was made by Frye (1902). According to his observations, groups of 1-6 non-nectariferous glands occur between the calyx and corolla, and near the axils of sepals, bracts and leaves; they may also be found on leaf midribs. Frye also reported double-fertilization in *Asclepias cornuti*, that the seed pappus is formed of single-celled, uninucleate epidermal hairs, and that the ovules in *Asclepiadaceae* are unitegmic, with the nucellus consisting of one layer of cells enclosing the sporogenous row and may contain nucellar tracheids.

Material and observations

We have been able to procure fresh and herbarium specimens of 510 species from 148 genera representing all tribes and subtribes of the *Cynanchoideae* in Schumann's classification (1895). Herbarium material has been obtained from the herbaria of Cairo University, Liverpool University, the Botanical Museum (Copenhagen), and the Institutes of Systematic Botany at Lund and Munich. The correct identification has been ensured by various means: (i) the examination of as many specimens carrying the same name as possible, (ii) local and regional floras, and (iii) matching with type or iso-type material.

The specimens have been subjected to a detailed comparative investigation and 59 aspects of discontinuous variation have been recorded for every species. The result is a voluminous data-matrix, of which copies are available on request. It will suffice here only to list the recorded characters (Table 1). They cover features from gross vegetative morphology, floral structure, epidermal patterns, types and distribution of calcium oxalate crystals (prismatics and druses) as well as the variation in structure and configuration of the different parts of the pollinial apparatus. Although most of the characters are self-explanatory, some are novel or less familiar and are in need of some clarification; for detailed description and illustration of all pollinial features reference may be made to El-Gazzar & Hamza (1973), El-Gazzar et al (1974), and Schill & Jäckel (1978).

Table 1. List of the 59 characters recorded comparatively for 510 species from 148 genera of the Asclepiadaceae-Cynanchoideae.

Stem:	1. erect / twining or scrambling
	2. succulent / not so
Leaves:	3. present / absent
	4. petiolate/ sessile-subsessile
	5. opposite / otherwise
	6. ovate-elliptical / lanceolate-linear
	7. margin entire / not so
	8. margin flat / recurved
	9. associated stomata, present / absent
hairs:	10. unicellular, present / absent
	11. multicellular uniseriate, present / absent
	12. multicellular multiseriate, present / absent
	13. glandular, present / absent
crystals:	14. druses, present / absent
	15. prisms, present / absent
Inflorescence:	16. umbel / otherwise
Flowers:	17. corolla stellate / campanulate
	18. petal limbs recurved / flat or erect
Pollinia:	19. tail, present / absent
	20. longitudinally symmetrical/asymmetrical
Caudicle:	21. corona present / absent
	22. wing present / absent
	23. horned / not so
	24. attachment to corpuscle basal/lateral
	25. 2 lateral arms present / absent
Calyx:	26. druses present / absent
	27. prisms present / absent
	28. unicellular hairs present / absent
	29. uniseriate hairs present / absent
	30. glandular hairs present / absent
	31. multiseriate hairs present / absent
Corolla:	32. druses present / absent
	33. prisms present / absent
	34. unicellular hairs present / absent
	35. uniseriate hairs present / absent
	36. glandular hairs present / absent
	37. petals caudate / otherwise
	38. druses in corona present / absent
	39. corona hairy / glabrous
Gynoecium:	40. druses in ovary-wall present / absent
	41. ovary hairy / glabrous
	42. druses in style present / absent
	43. style hairy / glabrous
	44. druses in stigma present / absent

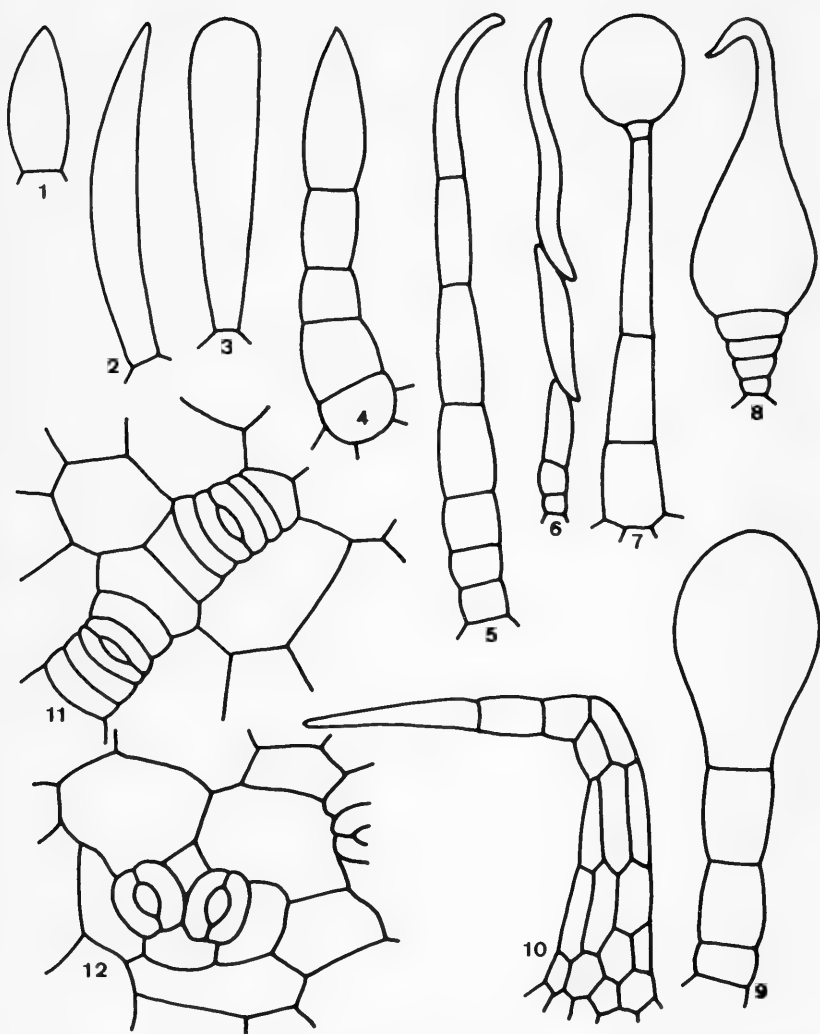
- 45. stigma hairy / glabrous
- 46. stigma appendaged / not so
- Indumentum: 47. glabrous/hirsute/tomentose/spiny
- Leaf-apex: 48. acute/acuminate/obtuse/notched
- Leaf-base: 49. cordate/rotundate/decurrent
- Stomata: 50. tera-/hexa-/anomo-/actinocytic
- Corona: 51. darker than petals/petals darker/both of the same colour
- Pollinia: 52. length in u
- 53. breadth in u
- 54. P/C ratio (pollinium length/corpuscle length)
- 55. pendulous/erect/horizontal
- 56. tail distal/basal/lateral inner/lateral outer
- 57. attachment to caudicle terminal/subterminal/median
- Corpuscle: 58. length in u
- 59. breadth in u

=====

Epidermal trichomes in the Cynanchoideae are invariably in the form of hairs and no scales have been seen in the species examined. These hairs show great structural diversity so that the following basic types can easily be recognized:

(i) unicellular: Figs. 1-3,
 (ii) multicellular, uniseriate eglandular: Figs. 4-6,
 (iii) multicellular, uniseriate glandular: Figs. 7-9,
 (iv) multicellular, multiseriate eglandular: Fig. 10,
 seen in only 5 species (Gomphocarpus appendiculatus, Xysmalobium dilatatum, Schubertia schreiteri, Schizoglossum bidens and Rothrockia cordifolia). Furthermore, in addition to the 4 basic types of stomata (tetracytic, anomocytic, hexacytic in Fig. 11, and actinocytic) as defined by van Cotthem (1970, 1971), associated (or contiguous) stomata (Fig. 12) have also been seen in 26 species from 16 genera. As far as we are aware this is the first recording of associated stomata in the Asclepiadaceae.

It should be pointed out that our observations on the pollinial apparatus coincide to a large extent with those of Schill & Jäckel (1978). However, there are some minor discrepancies concerning the dimensions of pollinia and corpuscles, which may be due to one or more of the following reasons: (i) incorrect identification of the plants, (ii) while we had to work mostly with herbarium specimens Schill & Jäckel used fresh material of most of the species in their sample and the flowers may not have



Figs 1-12. Diagrammatic representation of stomata and trichomes in Cynanchoideae. Figs. 1-3 unicellular hairs; Figs. 4-6 multicellular uniseriate hairs; Figs. 7-9 multicellular glandular hairs; Fig. 10 multicellular multiseriate hair; Fig. 11 hexacytic stomata; Fig. 12 associated stomata.

attained a fully mature stage in their development, (iii) the pollinia may not have been placed on the slides in the correct position for measurement, (iv) our pollen preparations have been made without resort to the hazardous, complicated and time-consuming acetolysis technique used by Schill & Jäckel, which is bound to affect all pollinial measurements.

Taxonomic discussion

In an attempt to test the various taxonomic treatments of the *Cynanchoideae* in the light of the recorded observations, the data-matrix has taken different forms during the various stages of the work. Originally the species have been arranged according to the classification of Decaisne (1844) and the percentage distribution of each character in all of his groupings has been calculated. It soon became apparent that Decaisne's system is not only inadequate for accommodating the multitude of genera described after it was published, but also incapable of imposing any discernible pattern on the recorded observations. Decaisne's classification is therefore excluded from further discussion.

The species have then been re-arranged according to the currently accepted classification of *Asclepiadaceae* by Schumann (1895) and the same procedure of calculating the percentage distribution of the characters in each group has been repeated. Although Schumann's scheme represents a marked betterment over that proposed by all his predecessors, the present test showed clearly that there is plenty of room for improvement in it. We have therefore set out to re-arrange the data-matrix in order to achieve groupings that are as homogeneous as possible irrespective of all other classifications of the family. In doing so, we have been backed by the comfortable feeling that our data-matrix is the largest set of comparative observations yet scored for the *Cynanchoideae* both in terms of the number of taxa and the number of characters recorded for them.

Three major groups (A, B and C) can easily be recognized as follows (see also Table 2):

GROUP A: Herbs, commonly erect; pollinia pendulous, never with extra-pollinial appendages; terminal attachment of caudicle to pollinia; P/C ratio usually 2.5 or more; petal lobes recurved.

GROUP B: Mostly scrambling or twining herbs or shrubs; pollinia generally smaller than in A, often erect (sometimes pendulous or horizontal); extra-pollinial appendages frequent (as distal or basal tail); attachment

Table 2. Distribution of 148 genera of Asclepiadaceae-Cynanchoideae among groups A-C as compared to the tribes and subtribes in Schumann's (1895) classification. Figures in parentheses represent the total number of genera in each of groups A-C, the number of genera studied from each tribe or subtribe, or the number of species examined from each genus. Genera not known to Schumann are listed as unclassified.

GROUP A (39)

Asclepiadeae-Astephaninae (6): Amblystigma (1), Astephanus (4), Hemipogon (1), Microloma (8), Mitostigma (3), Nautonia (1)

Asclepiadeae-Glossonematinae (7): Araujia (4), Macroscepis (1), Oxystelma (2), Parapodium (1), Prosopstelma (1), Rhyssostelma (1), Solenostemma (1)

Asclepiadeae-Asclepiadinae (19): Acerates (3), Asclepias (82), Blepharodon (2), Calotropis (2), Cordylogyne (1), Eustegia (1), Gomphocarpus (12), Kanahia (3), Lugonia (1), Madarosperma (1), Margaretta (3), Melinia (1), Pachycarpus (5), Pycnostelma (2), Stathmostelma (1), Stenostelma (1), Tassadia (1), Trachycalymma (1), Xysmalobium (8)

Asclepiadeae-Cynanchinae (2): Holostemma (1), Pleurostelma (1)

Unclassified (5): Amblyopetalum (1), Aphanostelma (2), Dorystephania (1), Oxylodium (1), Widgrenia (1)

GROUP B (100)

Asclepiadeae-Glossonematinae (6): Ceramanthus (1), Fischeria (2), Glossonema (2), Philibertia (1), Schubertia (2), Steinheilina (1)

Asclepiadeae-Asclepiadinae (11): Ampelamus (1), Ditassa (8), Enslenia (2), Funastrum (7), Macroditassa (1), Metastelma (17), Pentarrhinum (3), Podostelma (1), Raphistemma (1), Schistogyne (1), Schizoglossum (22)

Asclepiadeae-Cynanchinae (19): Cyathostelma (1), Cynanchum (35), Cynochtonum (1), Daemia (1), Decanema (1), Endotropis (1), Glossostephanus (1), Mellichampia (1), Metaplexis (2), Morrenia (3), Orthosia (3), Pentatropis (2), Peplonia (1), Roulinia (3), Sarcostemma (6), Sattadia (1), Seutera (1), Telosma (1), Vincetoxicum (5)

Asclepiadeae-Oxypetalinae (5): Calostigma (4), Gothofreda

Table 2 (cont.)

- (1), *Oxypetalum* (19), *Rojasia* (1), *Tweedia* (1)
- Tylophoreae-Ceropeginae (8): *Anisotoma* (1), *Brachystelma* (4), *Ceropegia* (12), *Echidnopsis* (1), *Leptadenia* (5), *Orphanthera* (1), *Riocreuxia* (3), *Sisyranthus* (3)
- Tylophoreae-Marsdeniinae (24): *Barjonia* (2), *Cosmostigma* (1), *Dischidia* (2), *Dregea* (2), *Fockea* (1), *Gongronema* (2), *Gymnema* (4), *Heterostemma* (2), *Hoya* (9), *Jobinia* (2), *Lorostelma* (1), *Marsdenia* (11), *Nephradenia* (1), *Pentasacme* (1), *Pergularia* (1), *Petalostelma* (1), *Rhyssolobium* (1), *Sarcolobus* (2), *Sphaerocodon* (2), *Sphinctostoma* (1), *Stephanotis* (1), *Tenaris* (1), *Treutlera* (1), *Tylophora* (9)
- Gonolobeae (15): *Chthamalia* (1), *Dictyanthus* (4), *Exolobus* (2), *Fimbriostemma* (1), *Gonolobus* (10), *Himantostemma* (1), *Ibatia* (2), *Malinvaudia* (1), *Matelea* (3), *Peckoltia* (1), *Phaeostemma* (1), *Pheratrichis* (2), *Rothrockia* (1), *Trichosacme* (1), *Trichostelma* (1)
- Unclassified (12): *Clemensiella* (1), *Dalziella* (1), *Diploplexis* (1), *Glossostelma* (1), *Gonianthela* (1), *Gynostelma* (1), *Ischnostemma* (1), *Pseudibatia* (2), *Steleostemma* (1), *Stigmatorrhynchus* (1), *Urostephanus* (1), *Vailia* (1)

GROUP C (9)

- Tylophoreae-Ceropeginae (9): *Boucerosia* (2), *Caralluma* (3), *Duvalia* (1), *Hoodia* (6), *Huernia* (2), *Huerniopsis* (2), *Stapelia* (12), *Tavaresia* (2), *Trichocaulon* (5).
- =====

of caudicle to pollinia mostly subterminal or median; P/C ratio usually less than 1.8; petal lobes not recurved.

GROUP C: Leafless cactus-like succulents; pollinia reniform, large, horizontal with lateral inner tail; P/C ratio often 1-2.4; petals stellate with short or indistinct lobes.

These are only the most conspicuous diagnostic features of groups A-C, and numerous other characters distinguishing between them could easily be extracted from the data-matrix, although they are not of the same discriminating value as those mentioned above.

It is interesting to note that the present detailed

study has led to the subdivision of the Cynanchoideae in much the same way as achieved previously with a considerably smaller sample of plants (89 species from 33 genera) and characters by El-Gazzar, Hamza & Badawi (1974), who succeeded in recognizing the same 3 major groups A-C. This attests (though indirectly) to the taxonomic soundness of these groups: any groups based on 33 genera and can be easily expanded to accommodate 148 genera are of necessity taxonomically robust. Another useful aspect of groups A-C is that they provide a satisfactory pigeonholing system for 17 of the genera which have not hitherto been taxonomically catered for. Of these genera 5 are associated with members of group A, while the rest fall in group B.

It is clearly evident from Table 2 that Schumann's (1895) classification of the Cynanchoideae incorporates some homogeneous and some heterogeneous taxa. The former include the tribe Gonolobeae (in B), subtribe Tylophoreae Marsdeniinae (in B) and 2 of the 5 subtribes of the Asclepiadeae (Astephaninae in A and Oxypetalinae in B); all representatives of these taxa appear together in the same group although none of them emerged separately as a distinct assemblage. The heterogeneous taxa in Schumann's arrangement are the 4 subtribes Asclepiadeae Glosso-nematinae (with 7 genera in A and 6 in B), Asclepiadeae Asclepiadinae (with 19 genera in A and 11 in B), Asclepiadeae Cynanchinae (with 2 genera in A and 19 in B), and Tylophoreae Ceropegiinae (with 8 genera in B and 9 in C).

No attempt will be made here to formalize the present arrangement of genera since it is not based on the study of all known genera and species; clearly it would be futile to generalize the diagnoses given to groups A-C to cover genera on which they have not been based. However, we offer groups A-C as a reasonable taxonomic frame-work for this large subfamily of the Asclepiadaceae in the hope that future investigations might cover other genera not dealt with by us and further support our taxonomic ideas.

Acknowledgements

We wish to thank the Keepers of the herbaria at Cairo University, Liverpool University, the Botanical Museum (Copenhagen), and the Institutes of Systematic Botany for the generous loans and donations of specimens and for other herbarium and library facilities.

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MISCELLANEOUS NOTES ON NEOTROPICAL FLORA, XI

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The present notes include diagnoses or descriptions of new infraspecific taxa in genus Espeletia. For previous contributions, see PHYTOLOGIA 40(1): 25. 1978. The basic work for these notes was partially supported in the past by National Science Foundation Grant No. DEB72-01839.

ESPELETIA PYCNOPHYLLA var. GALERANA Cuatr. var. nov.

Caulirosula usque ad 4 m alta. Lamina foliorum oblongo-elliptica utrinque plus minusve attenuata apice acuta 22-30 cm longa, 4.5-8 cm lata, ratio 3-6:1, supra basim (1.5-)2-3 cm lata minima latitudine, nervis inter se 5-10(-12) mm distantibus, angulo 45-50° (-60°) ascendentibus, vagina 5.6 x 5.6 cm. Inflorescentiae quam in typo speciei breviores contractae, 25-35(-40) cm longae, parte floriferae 1/5-1/4 (vel 1/3) totius longitudinis, 5-7 capitula ferentes, internodia 8-3 cm longa, ramis monocephalis inferioribus 4-8(-12) cm longis, alteris 3-5(-6) cm, pedicellis ultimis 2-3 cm, pedicello terminali 2-3(-4) cm. Bractee subten-dentes proximales 5-10(-13) x 1-2.5 cm, ceterae 3-6 x 1-1.5 cm. Indumentum illo typo simile sed praecipue sursum magis lutescente. Capitula 20-30 mm, circulo ligularum 30-35 mm, disco 16-17 mm.

Typus: COLOMBIA, Nariño: Macizo del Volcán Galeras, eastern slopes, paramo bushes 3900 m, caulirosula 2 m high, leaves yellowish white, ligules yellow, 7 Feb 1965, Cuatrecasas & Mora 26931; holotypus COL; isotypus US.

ESPELETIA PYCNOPHYLLA var. LACINULATA Cuatr. var. nov.

Lamina foliorum elliptico-oblonga apice subite angustata et apiculata, 46-52 cm longa, 10-14 cm lata, ratio 3.6-4.5:1, basim versus attenuata supra basim minima latitudine (2.6-)2.8-3 cm lata; margine in tertio inferiore usque ad 8 laciniis linearibus utroque latere, usque ad 3 cm longis, indumento incluso 4-8 mm latis, patulis numero et magnitudine asymmetricis, saepe aliquiis distalibus dentem brevem reductis; reliqua lamina marginibus sub-integris vel irregulariter leviterque undulata interdum deorsum parvis dentibus brevibus 1-3 praedita; nervis secundariis 8-16 mm inter se distantibus angulo 45-50° ascendentibus. Inflorescentiae 64-50 cm longae, parte media vel tertia superiore fertili 9-13 capitula ferenti, 3-4 paribus paracladorum. Paracladia mono-cephala vel inferiora 12-17 cm longa bi-tricephala. Capitula

35-40 mm diam, circulo ligulari 38-47 mm, disco 18-20 mm diam in vivo; circa 290 flores ferentia; radiis 56, corolla 13.5-15 x 2-2.6 mm, tubulo 0.7-0.8 mm, flosculis disci 234, corolla 7.2-7.5 mm glabra.

Typus: COLOMBIA: Nariño-Putumayo: Páramo de Quilinsayaco, over the ridge of the Cordillera eastern side, 3200-3250 m, trunk 1.5 m tall, covered by marcescent leaves, habit whitish or greenish white, leaves up to 14 cm wide, with marginal lacinies in the lower third; all the leaves have these projections but this is the only individual with this feature in the population. Inflorescences greenish white or cinereous, ligules and disc corollas light yellow, anthers yellow, resin in translucent colorless tears, "frailejón," 21 Mar 1973, Cuatrecasas, Hernández & Estrada 28653; holotypus US; isotypus COL.

ESPELETIA PYCNOPHYLLA subsp. *ANGELENSIS* Cuatr. subsp. nov.

Caulirosula, caule simplici usque ad 7 m alto. Lamina foliorum oblongo-elliptica apice angustata acutaeque basim versus gradatim attenuata, 27-35(-40) x 5-8.5(-9.5) cm, basi minima latitudine (15-)20-40 mm lata, ratio 3.4-5.5(-6):1; nervis secundaris 5-8(-10) mm inter se distantibus, angulo 45-55° (-60°) ascendentibus; costa ad basim triangulata gradatim valde ampliata et in vaginam coriaceam producta. Vagina trapezoidali-oblonga, 5-7.5 x 5.5-6.5 cm, ad apicem cuneato-attenuata gradatim in laminam transiens; lamina utroque latere costae tota longitudine et parte distali vaginae decurrens marginem alatum gradatim angustatum usque evanescentem formans.

Inflorescentiae thyrsoides axillares rosula foliorum breviores vel aequilongae. Axis (26-)30-42(-50) cm longus robustiusculus striatus; pars vegetativa 16-30(-38) cm longa, saepius 2/3 longius quam parte fertili, saepe circa medium vel supra duobus foliis oppositis sterilibus sessilibus basi breviter connatis, (9-)11-18 x (1-)1.3-2 cm, oblongis attenuatis acutis munita, vel parte vegetativa exfoliata, nuda; pars florifera longi-bracteata plus minusve pyramidato-paniculata (8-)10-17(-24) cm longa, 5-11(-13) capitula ferens, tria in cyma terminali cetera in 1-3 paribus paracladiorum instructa, internodio proximali 4-13 cm longo, ceteris sursum gradatim brevioribus supremo 3-1.5 cm, pedunculo terminali 5-1 cm longo. Paracladia internodia excedentia, proximalia 4-13(-16) cm, sequentia 3-6 cm, sursum breviora, pedunculis supremis 1-3 cm longis, proximalia interdum 3-2 capitulifera cetera et saepe omnia monocephala. Bractee subtedentes foliaceae saepe ramis pedunculisque longiores, proximales majores, lineari-oblongae attenuato-acutatae 6-15 x 1.3-2 cm, sequentes gradatim breviores elliptico-oblongae vel ovato-oblongae apice attenuato-acutatae, basi amplectentes vaginosae, sursum limbo gradatim reducto, supremae (5-)3.5-2.5 x 1.5-1 cm, adaxiale inferne glabrae vaginantes. Axis rami pedicellique dense crasseque albo vel ochroleuco-lanati pilis

circa 25 mm longis tenuissimis inferne plus minusve plurispiraliter contortis extremo moderate flexuosis vel rectis ad modum indumenti barbati insuper instructis. Bracteae indumento similiter lanato-villoso et lanato-barbato sicut involucri albo vel moderate ochroleuco.

Capitula ligulis amotis 20-30 mm diametentia, 155-210 flores ferentia, circulo ligularum 30-36 mm, disco 14-16 mm diametro, involucri et circulo ligularum complanato 40-45 mm diam. Involucrum cupulatum (18-)20-22 mm altum, dense albo-lanato-barbatum. Phyllaria sterilia (5-)6-9, saepe dua exteriora opposita 28-26 x 21-12 mm, oblonga apice attenuata subobtusata vel subacuta, saepius dua vel quatuor 23-20 x 18-12 mm ovata vel oblonga obtusa vel obtusissima, altera 19-15 x 16-13(-10) mm oblonga obtusissima vel obtusa extus dense lanata. Phyllaria fertilia exteriora parca 13-10 x 7-3.5 mm herbaceo-chartacea, basi maturitate valde incrassata, elliptico-oblonga vel oblonga apice obtusa subite apiculata vel attenuata subacuta vel acutata extus lanuginosa, introrsum gradatim tenuiora angustioraque intima (10-)9-7.5 x 4-2.5 mm, membranacea oblongo-elliptica, oblongo-ovata vel elliptica, inferne amplectente apice acutata sparse lanuginea apice dorsale pilosula ciliataque pilis flexuosis 0.6-1 mm et raris vel haud glandulis. Receptaculum 14-16 mm diam, planum vel leviter convexum glabrum. Paleae 7-8(-8.5) x 1.8-3 mm scariosae hyalinae vel subhyalinae 7-9-nervatae amplectentes, ovaes, apice convexo angulata acutata interdum parce irregulariterque denticulatae dorsale minute lanugineo-barbato pilis flexuosis 0.2-0.5 mm et saepe parvis vel parvissimis glandulis sursum ad marginem.

Flores radii ligulati 3-seriati, 40-56 in capitulo. Corolla lutea, 11-16 mm longa, tubo 0.5-2(-2.5) mm longo incrassato dense minuteque crassi-piloso, pilis conicis crassis obtusis vel subobtusis 0.1-0.2 mm et parvis glandulis pediculati-capitatis 0.03-0.1 mm patulis inter-sparsis, lamina 2-3(-3.5) mm lata crassiuscula rigidula oblonga saepe sursum gradatim attenuata, apice minute 3(-2) dentata, abaxiale parvis glandulis inferne copiosioribus. Stylus erectus 6-8 mm ramis crassiusculis 2-2.2 mm longis. Achaenia externa 3-3.1 x 2-2.1 mm oblongo-obovata triangulata apice truncata basi attenuata obtusa dorso leviter convexo angulis argutis, intima 3.2-3.5 x 1-1.4 mm quadrangulata oblonga angulis 4 argutis vel dorsali subobtusata. Interdum achaenia breviora tantum 2-2.2 mm longa.

Flores disci 108-152 in capitulo. Corolla lutea 7-8.5 mm longa, tubulo 2.5-3.5(-4) mm longo, glabro vel sursum vel tantum apice parvis vel parvissimis pilis crassis subconicis obtusis 0.1-0.2 mm et parvis vel raris glandulis pediculati-capitatis ad 0.05 mm, limbo tubuloso glabro vel basi parvis vel raris pilis minutis et raris glandulis, lobis triangularibus circa 1 mm altis incrassatis dense papillosulis dorso glabris. Anterae (2.6-)3 mm longae, appendice ovata subacuta 0.5 mm longa. Stylus 7.5-8 mm. Nectarium 1 mm longum tubulosum extremo plus minusve profunde 5 dentato.

Typus: ECUADOR, Carchi: Páramo del Angel, 3400 m, 21 Jun 1939, Erik Asplund 7078; S, holotypus. Páramos del Angel, ca Voladero, 3825 m, caulirosula, largest one seen 3.45 m, with many flowering stalks, old leaves whitish, green felty with white hairs above, involucre bracts and flower stems very hairy, ligules yellow, 26-28 Sep 1959, Barclay & Juajibioy 9411; US, paratypus.

ESPELETIA PYCNOPHYLLA subsp. LLANGANATENSIS Cuatr. subsp. nov.

Caulirosula erecta usque ad 8 m alta. Lamina foliorum grandis sessilis elliptica utrinque paulo attenuata apice subacutata vel subobtusa, margine integra, 41-43 x 12.5-12.7 cm, ratio 3.2-3.4:1, basi usque ad 3 cm latitudine contracta, nervis secundariis circa 10 mm inter se distantibus angulo 60° ascendentibus, utrinque dense albo-lanata, insuper gossypino barbata, vagina deorsum gradatim ampliata.

Inflorescentiae thyrsoides axillares rosula foliorum plus minusve aequilongae. Axis in specimine unico 57 cm longus, crassiusculus, argute striatus; pars vegetativa circa 35 cm longa supra medium duobus foliis sterilibus oppositis sessilibus basi connatis, oblongo-ellipticis subacutis, 13-14 x 3-3.5 cm instructa, sectio basali 19 cm longa, internodio mediali 16 cm longo; pars fertilis circa 22 cm longa, 9 capitulis in panícula breviter pyramidali, tria in cyma terminali cetera in 3 paribus paracladiorum disposita. Paracladia monocephala ad modum pedunculi, proximalia 17-18 cm longa cum bractea brevi (2.5-3 cm) infra apicem instructa, sequentia 11 cm, distalia 7 cm longa. Pedunculi cymae terminalis 3-3.7 cm longi, sicut paracladia, apice curvati capitula nutantia ferentes. Bractee subtendentes ellipticae quam ramis pedunculisque valde breviores, proximales 8 x 2.5 cm, sequentes sursum 5-3.5 x 1.5 cm, supremae circa 2.5 x 1.2 cm. Omnes partes axorum ramorum bractearum dense, valde crasse albo-lanatae lana crispa intricata ad superficiem longe barbata.

Capitula nutantia vel cernua circa 30 mm lata, 190-200 flores ferentia, circulo ligularum circa 35 mm, disco 17 mm diametro. Involucrum cupulatum dense crasseque albo-lanatum et barbulatum 22 mm altum. Phyllaria sterilia 8, crasse chartacea, dua exteriora 23 x 12 mm oblongo-ovata subacuta, altera dua 20 x 14-13 mm, oblongo-obovata vel oblongo-elliptica obtusa, cetera 19-18 x 12-9 mm, obovato-oblonga obtusaeque dense albo-lanata longeque barbata. Phyllaria fertilia exteriora 15-13 x 8-7 mm chartacea, oblonga vel obovato-oblonga subobtusa, obtuse angulata, basi incrassata, lanata vel lanuginosa, interiora 12-8.5 x 5-3 mm, tenuiora oblonga acutata, sursum paulo lanuginosa saltem apice barbulato pilis 0.5-1(-1.5) mm haud glandulis. Receptaculum planum, vel leviter convexum 14-15 mm diam glabrum. Palea 7-7.5 x 2.2-3 mm, ovaes, vel obovato-ellipticae apice angulato vel subobtusos, dorso subapicale barbulato pilis ochraceis flexuosis ad 1 mm longis, glandulis non vidi.

Flores radii ligulati circa 46 in capitulo corolla lutea 13-14 mm longa crassiuscula rigida, tubo 1.6-2 mm longo, incrassato copiose pilosulo pilis crassis subconicis 0.1-0.2 mm parcissimis glandulis pediculato-capitatis 0.05 mm interspersis, ad apicem adaxiale appendice ligulata ad 2 mm longa; lamina oblonga 2-3-dentata, 2.5-3 mm lata, 7-9 nervis subtus plus minusve conspicuis, inferne abaxiale sparsis pilis et parcissimis glandulis. Stylus 5.5-6 mm longis ramis circa 2 mm. Achaenia exteriora parca 3 x 2 mm late oblonga triangulata apice truncata basi paulo attenuata, dorso plano vel leviter convexo angulis argutis, interiora 3.8 x 1.2 mm oblonga quadrangulata, basi paulo attenuata.

Flores disci circa 146 in capitulo. Corolla lutea 8-8.3 mm, tubulo 3.7-3.8 mm, angusto, glabro vel raro apice parcissimis (1-2) pilis 0.1-0.3 mm longis, limbo tubuloso glabro, lobis triangularibus acutis 1 mm longis margine papillosis, abaxiale glabris. Antherae 2.7 mm longae appendice apicali 0.5 mm longa. Stylus 8-9 mm. Nectarium tubulosum 5-dentatum 0.8 mm longum.

Typus: ECUADOR, Cordillera de Llanganates, near Las Torres, paramo, 3700-3800 m, 4 m high, flowers yellow, 23 Nov 1939, Erik Asplund 9944; S, holotypus.

ESPELETIA LOPEZII var. ESCOBALENSIS Cuatr. var. nov.

Lamina foliorum 26-35 cm longa, 5-7(-8.5) cm lata, oblonga vel elliptico oblonga, ratio 4-6:1, nervis secundariis angulo 45-60° divergentibus. Pseudopetiolus 4-7 cm longus, 1.1-1.4 cm minima latitudine. Vagina foliorum oblonga, 11-12 x 5-6 cm. Inflorescentiae 60-82 cm longae; pars fertilis 5-cephala, cyma terminali 3-cephala, pedicellis robustis 3-5 cm longis, internodio 7-16 cm longo, duobus pedunculis proximalibus monocephalis ascendentibus 5.5-14 cm longis. Bractae subtendentes proximales 10-15 x 2-3 cm, oblongo-acutatae, distales 6-7 x 1.3-1.8 cm longae. Capitula 3.5-4.5 cm diam in sicco. Corollae femineae 18 mm longae, tubulo 6-7 mm, copiose piloso, pilis patente-antrorsis acutis. Corollae masculae, 10-12 mm longae, tubulo 5-5.5 mm, limbo tubuloso lobis triangulari-oblongis, 1 mm longis extus glabris.

Typus: COLOMBIA, Boyacá: Páramo del Alto del Escobal, 3800 m altitude, on the old trail from Soatá to Cocuy, caulirosula 1-3 m tall, 8 Sep 1938, Cuatrecasas & García-Barriga 1236; US, holotype; COL, F, isotypes.

ESPELETIA HARTWEGIANA subsp. CENTROANDINA Cuatr. subsp. nov.

Lamina foliorum anguste elliptica vel anguste oblonga apice acuta, 20-30(-35) cm longa 2.6-5(-5.8) cm lata, ratio 5.5-8:1 (4.5-8.6:1), basim versus paulo attenuata, supra basim 1.5-2.6 cm minima latitudine, basi gradatim ampliata et in latam vaginam trapecialem 5.5-7.5 x 5.5-8 cm latam producta; nervis secundariis

5-8(-10) mm inter se distantibus, angulo 50-60° (-75°) ascendentibus, utrinque indumento denso lanato et insuper dilute longequae sericeo-barbato instructo.

Inflorescenciae vulgo 8-14 in rosula quam rosula breviores vel aequilongae raro paulo longiores 23-45(-54) cm longae, parte vegetativa 1/2-2/3 totae longitudinis, 13-40 cm longa 1-2 paribus foliorum steriliū instructi uno semper circa basim inserto foliis quam internodiis (9-20 et 5-8 cm) valde longioribus, infimis (10-) 16-26 x (1-) 1.3-2 cm, lamina lineari subite acutata vagina 4-5 cm longa basi 1.5-2.5 cm longe tubulosa, alteris 9-14 x 0.8-1.5 cm lamina lineari vel lineri-triangulari vagina ampliata 4-4.5 cm longa tubo 2-2.5 cm longo. Pars fertilis 1/4-1/2 longitudinis in thyrsō elongato (8-) 10-20 cm longo, 5-21 capitula ferenti instructa, internodiis sursum 5-7, 3.2-6.5 et 5-7 cm longis, ramis 1-4 paribus, inferioribus 3.5-13 cm longis, alteris 2-8 cm longis saepe monocephalis vel interdum uno vel duobus 3-2-capituliferis, cyma centrali pedicellis 1-5.5 cm longis; bractae subtendentes inferiores 4-11 x 0.8-3 cm, lineari-triangulares basim magis ampliatis vagina ad 4 cm longa cum tubo 3 cm, alterae sursum gradatim breviores 3-6 x 1-2.5 cm, supremae 3-2.5 x 1.5-1 cm, etiam basi triangulares amplectentes. Axis folia bractae rami pedicellique dense lutescenti vel aureo-lanati et copiose longequae barbati.

Capitula ligulis amotis 25-28 mm lata (in sicco), circulo ligularum 32-40 mm, disco 15-20 mm diametro. Phyllaria sterilia (6-) 10-14, exteriora praecipue 2 late lanceolata vel oblonga attenuata 31-25 x 10-7 mm, altera oblonga et late oblonga obtusiuscula 25-18 x 8-7 mm, omnia dense crasseque lanata, interiora 18-11 x 12-5 oblonga obtusa vel interna acutata. Phyllaria fertilia exteriora late oblonga vel anguste oblonga obtusiuscula (18-) 13-10 x (8-) 5-3.5 mm, lanata vel lanuginosa basi incrassata, altera attenuata acutata 11-8 x 3-2.5 mm rigidula, basi incrassata costa subcarinata eminenti dorso sparse lanuginoso-villosa. Receptaculum 12-20 mm diam. planum glabrum vel raris pilis. Paleae 8-10 x 2.3-3 mm, oblongae vel obovatae obtusiusculae vel acutatae subapice dorsale copiose breviterque lanugineo-villosae pilis 0.2-0.5(-1) mm.

Flores 183-284 in capitulo, radii 55-84, disci 128-200. Corollae femineae 12-16 mm, tubo 1.5-1.8(-2) mm pilosulo pilis crassis basi tuberculiformi 0.05-0.1 mm et parvis glandulis conicopediculatis capitatis 0.05 mm long; lamina elliptico-oblonga obtusa 2-3 mm lata 7-9 nervata, basi abaxiale minute pilosula et glandulosa. Achaenia marginalia 3-angulata 2-3 x 2-2.2 mm, interiora quadrangulata 3-3.2 x 1-1.2 mm. Corollae masculae 8-9 mm, tubo 3-3.5 mm apice sicut basi limbo parvis vel parvissimis pilis crassiusculis minutis 0.03-0.1 mm, lobis triangularibus 1-1.1 mm longis margine incrassato dense longequae papilloso, abaxiale glabris. Nectarium 0.6-0.9 mm.

Typus: COLOMBIA, Caldas: Cordillera Central, western slopes, SW drainage of Nevado del Ruiz, above El Aprisco, paramo 3600 m altitude, caulirosula, trunk 1-3 m high, 5 May 1940, Cuatrecasas 9312; holotypus, COL; isotypi, US, F. Tolima: Nevado del Tolima,

SE slopes at Las Mesetas 3600 m altitude, caulirosula 2 m high, 13 May 1932, Cuatrecasas 2869; MA, K, paratypes.

ESPELETIA HARTWEGIANA subsp. *BARRAGENSIS* Cuatr. subsp. nov.

Lamina anguste elliptica 28-36 cm longa 4.5-6.7(-7.2) cm lata, ratio 4.5-6.4:1, apicem versus angustata acutataque, basim versus gradatim attenuata et subite ad basim in ad modum pseudopetioli 9-11 mm angusti brevissimi (1 cm longi) contracta. Nervis secundariis 5-8(-10) mm inter se distantibus, angulo 50-60° ascendentibus, utrinque indumento dense lanato et insuper dilute sericeo-longi-barbato instructo. Vagina 6-7 x 6.5-7 cm, coriacea robusta subovata apice obtusiuscula et subite triangulata, abaxiale dense longissimeque lanato-barbata, ad apicem indumento crasse floccoso-lanato siccitate facile deciduo.

Inflorescentiae rosula foliorum breviores vel aequilongae, aspectu valde foliosae dense luteo-lanata et copiosissime aureo-barbata, 28-42 cm longae, parte vegetativa 2/3 totae longitudinis, 15-25 cm longa duobus paribus foliorum oppositorum basi ample vaginantibus; foliis internodia (6-15 et 7-13 cm) valde excedentibus, infimis 14-23 x 1.3-2.2 cm anguste oblongis acutis supra basim leviter vel haud attenuatis, vaginis 4-5 cm longis in tubo circa 1 cm longo coarctatis intus glabris extus barbis longissimis (ad 30 mm) facile secedentibus vestitis, alteris 8-14 x 1-3 cm, vaginis 2-4 cm longis latissime amplexantibus basi tubo brevissimo (1 mm). Pars fertilis 1/3 totae longitudinis 10-20 cm longa simplice thyrsoidi 5-7 capitula ferens, internodiis 3-6 et 3.5-5 cm longis, ramis erectis monocephalis in 2-3 paribus dispositis, inferioribus 5-8 (-12) cm longis reliquis sursum leviter decrescentibus supremis 3-6.5 cm longis, pedicello centrali 3.5-5 cm, capitulis nutantibus 30-35 mm latis in sicco. Bractee subtendentes internodiis valde longiores, inferiores 5-10 x 1.5-2 cm, anguste oblongae acutae inferne dilatatae, vagina lata circa 3 cm longa basi breviter tubulata indumento aureo-lanato barbatoque facile deciduo, alterae bractee breviores magis ovatae vel triangulatae 3-7 x 1.5-2 cm, supremae 6-3.5 x 2-1.3 cm, vagina 2-3 cm.

Capitula ligulis amotis circa 35 mm lata (in sicco), circulo ligularum 35-40 mm, disco 19 mm diam. Phyllaria sterilia crasse lanata 13-14, tria exteriora 35-30 x 16-13 mm, elliptico-acutata, altera tria 25-22 x 12 mm obtusa, 4 sequentia 22-19 x 12-9 mm, interiora 17-15 x 8-7 mm elliptico-oblonga subacutata. Phyllaria fertilia 12-10 x 7-5 mm, anguste elliptica subacutata, coriacea vel subcoriacea basi indurata incrassata concava achaenia subamplexantia dorso villosa lanuginoso marginibus scariosis subglabris apice acuto, interiora apicale pilis paulo flexuosis erectis crassiusculis acutis 0.5 mm, sursum parvis glandulis 0.04-0.07 mm. Receptaculum 18 mm diametro planum parce pilosum pilis teneris erectis 0.5 mm. Paleae 10-11 x 3-4 mm, scariosae ovales acutae dorso subcoriaceae rigidae subnaviculares amplexantes basi induratae

8-10-nervatae apice sublanugineo-barbata pilis 0.5-1 mm et glandulis sparsis.

Flores circa 231 in capitulo radii 67, disci 164. Corollae femineae 11.5-15 mm longae, tubulo 0.8-1.2 mm, basim dense piloso pilis 0.1-0.3 mm, crassis obtusis et sursum sparsis glandulis subconicis vel cylindraceis capitatis 0.02-0.06 mm; lamina crassiuscula 2.2-2.5 mm lata, acute 2-3-dentata 5-7-nervata basim parce vel copiose glandulifera. Achaenia marginalia 3 x 2-2.2 mm, triangulata obovoidea basi acuta dorso modice convexo et tenuiter 2-3-nervato, angulis argutissimis subalatis, interiora 3-3.3 x 1 x 1.2-1.4 mm quadrangulata. Corollae masculae 8-10 mm longa tubo 3.5 mm apice sicut basi limbo parvis pilis obtusis brevibus crassis 0.2-0.4 mm et raris glandulis 0.05 mm, lobis triangularibus 1 mm altis marginibus incrassatis papillosisque, abaxiale glabris sed parvis glandulis obovoideis pediculatis 0.02-0.03 mm. Nectarium 0.9 mm altum tubulosum denticulatum.

Typus: COLOMBIA, Valle: Cordillera Central, western drainage, valley of Río Bugalagrande, Paramillo de Santa Lucía (= Páramo de Bavaya), 3680 m altitude, caulirosula, trunk 0.5-4 m high, rosette with whitish appearance, inflorescences yellowish, 16 Mar 1946, Cuatrecasas 20076; holotypus, COL; isotypi, F, P, US.

ESPELETIA HARTWEGIANA var. VEGASANA Cuatr., nov. var.

Lamina foliorum elliptica apice subite angustata acutataque, saepe apiculata, 26-27 cm longa 8.5-9.5 cm lata, ratio 2.7-3:1, basim angustata usque ad 2.2-1.7 cm latam contracta, nervis secundariis 6-11(-13) mm inter sese distantibus, angulo 50° (-55°) ascendentibus, utrinque dense lanata et copiose barbata. Vagina subovata crasse coriacea multinervata 6-7 x 6.5-8 cm, abaxiale dense adpresseque lutescenti barbata, apice sicut basi lamina dense longissimeque longi-barbata.

Inflorescentiae rosula foliorum breviores, dense foliosa et aureo-lanato barbata, 28-30 cm longa, parte vegetativa 1/3-1/2 totae longitudinis, 10-17 cm longa plerumque duobus paribus foliorum; foliis oppositis internodia (5-12 cm) excedentissimis, infimis circa 20 x 3-3.2 cm, lamina oblonga vel elliptici-oblonga deorsum leviter attenuata, basi longe lateque vaginatis, vaginis circa 6 cm longis in tubo 2.5-3 cm longo coalitis, abaxiale copiose longeque barbato-lanatis indumento facile separabili, foliis alteris anguste ellipticis circa 16-17 x 2.5 cm, ample vaginatis. Pars fertilis dense bracteata simpliciter thyrsoidea capitula 7-8 ferentia, internodiis 8-5.5 cm longis ramis plerumque in 3(-4) paribus, monocephalis sursum leviter decrescentibus, 8-4(-2.3) cm longis, pedicello terminali circa 3 cm. Bractee subtendentes late foliosae elongato-ovatae amplectentes quam internodiis ramisque longiores, proximales 11-14 x 2.5-3.5 cm, vagina 4-5 cm cum tubo 0.6-3 cm longo, ceterae bractee 13-7 x 2.5 cm, vaginis 2-5 cm tubo ad 2.5 cm, supremae 4 x 2 cm.

Capitula ligulis amotis 30-35 mm lata (in sicco), circulo ligularum 35-40 mm, disco 18-19 mm diam. Phyllaria sterilia crasse longeque lanata circa 10, saepe 2 exteriora obovato-oblonga attenuata 30 x 16 mm, altera dua 26 x 20 mm, elliptica obtusissima, sequentia 20-17 x 12-10 obovato-elliptica obtusa et saepe duo interiora 14-13 x 6 mm. Phyllaria fertilia exteriora 15-13 x 6-5 mm anguste elliptica obtusiuscula vel subite acutata pilis 1 mm, intricatis, interiora 11 x 2.5-3 mm scariosa obtuse angulata, 7-nervata apice barbulata, pilis 0.2-0.8 et parvis glandulis 0.05 mm. Receptaculum planum 12-13 mm diam. Paleae 10 x 2-2.5 mm, scariosae apice subcucullatae dorsale breviter barbulato-ferrugineae, 8-9-nervatae pilis subflexuosis acutatis 0.2-0.5 mm, interdum parvis glandulis interspersis.

Flores 270-280 in capitulo, radii 77-80, disci 200. Corollae femineae 14-15 mm longa, tubo 1-1.3 mm longo densissime piloso pilis brevibus vel brevissimis crassis obtusis 0.3-0.05 mm et glandulis conici-pediculatis sparsis. Lamina elliptico-oblonga obtusa 2.2-2.8 mm lata, abaxiale basi minute pilosa et parvis glandulis, ovaria marginalia 3 x 3.3 mm obovata triangulata basi acuta. Corollae masculae 9-9.5 mm, tubo 3-3.3 mm tantum apice sicut basi limbi parvis pilis brevibus crassissimis 0.1-0.2 mm obtusis et raris glandulis, lobis 1.3-1.4 mm longis triangularibus marginibus incrassatis papillois, abaxiale glabris. Nectarium 1.2 mm altum tubulosum dentatum.

Typus: COLOMBIA, Valle: Cordillera Central, west drainage, headwaters of Ríos Tuluá and Bugalagrande: Páramo de Las Vegas, 3800 m altitude, caulirosula with whitish appearance, inflorescences yellowish, trunk up to 1 m high, 22 Mar 1946, Cuatrecasas 20285; US, holotypus; COL, F, isotypi.

ESPELETIA HARTWEGIANA var. MORARUM Cuatr. var. nov.

Lamina foliorum anguste elliptica vel oblongo elliptica 27-34(-38) x 6-9(-10) cm, ratio 3.5-5:1 apice plus minusve subite acutata, basim usque ad 1.2-2.2 cm latam angustata, nervis secundariis 5-11 -m inter se distantibus, 40-55° (-60°) angulo ascendentibus, utrinque dense lanata et barbata. Vagina 5.5-7 x 5.5-7 (-8) cm ovato-oblonga apice obtuse attenuata.

Inflorescentiae 4-23 in rosula, folia paulo vel usque 1/3 illa longitudine excedentes, 42-63 cm longae, parte vegetativa 2/3-4/5 totae longitudinis, 33-48 cm longa, in 1/3 inferiore parte vel circa mediam tantum uno pare foliorum sterilium instructa, foliis linearibus vel oblanceolato-linearibus (10-)12-17 x (1-)1.5-2 cm, basi vaginatis amplexantibusque. Pars fertilis 1/5-1/3(-2/5) totae longitudinis, (6-)9-17 capitula ferenti, in panícula corymbiformi 10-20 cm alta instructa, interodiis sursum 3-8, 1.5-7 et 3-4 cm longis, 3-4 paribus ramorum oppositorum ascendentium, saepe duobus vel uno paribus proximalibus cyma 3-cephala instructis, ceteris ramis monocephalis, interdum ramis omnibus monocephalis;

ramis infimis 10-14 cm longis ceteris sursum gradatim decrescentibus, supremis 5.5-2.5 cm longis, pedicello centrali (terminali) (1-)2-5.5 cm longo, pedicellis secundariis (cymae lateralium) 1.5-3 (-5) cm longis. Bracteae subtendentes foliaceae lineares vel lineari-triangulares, proximales 6-8 x 1-1.8 cm basi ampliata amplectenti, alterae triangulares vel ovato-triangulares, 3-7 x 1-1.6 cm, ceterae sursum gradatim minores supremae 4-2.5(-1.5) x 1-0.7 cm. Inflorescentiae omnino dense luteo-lanatae longaeque aureo-barbatae.

Capitula 22-35 mm lata ligulis amotis, circulo ligularum 30-40 mm, disco 17-22 mm diam. Phyllaria sterilia 6-9, exteriora 3-5 dense longae lanata (24-)22-15 x 10-6(-5) mm, anguste elliptica acuminata vel acutata interdum subobtusata, interiora elliptico-oblonga vel oblonga (17-)15-10 x 8-4 mm, attenuata vel subite acutata dense lanata vel lanato-villosa. Phyllaria fertilia exteriora 11-7.5 x 6-4(-2.5) mm, anguste elliptica attenuata acuta vel acuminata basi incrassata, dorso lanata vel lanato-villosa pilis 1-2 mm longis, interiora 7-6 x 2.5-4(-5) mm teneriora concava semi-amplectentia, elliptica vel subobovato-elliptica acuta, nervis crebris, dorso lanuginosa sursum barbata pilis 1.5-2 mm flexuosis et parvis glandulis, intima amplectentia tantum subapice dorsale barbata pilis 1-2 mm. Receptaculum 11-13(-16) mm, planum ad centrum convexum glabrum vel parvis vel parvissimis pilis. Paleae 6-7 x 2-3 mm scariosae basi incrassatae ovales subacutae naviculares amplectentes, nervis pluris 3-5 magis notatis, subapice dorsale barbatae lanuginosae pilis brunnescentibus flexuosis erectis 0.5-1 mm et parvis glandulis 0.02-0.04 mm, interdum dorso secum costae pilosulae.

Flores 171-295(-324) in capitulo, radii 36-93, disco 135-218. Corollae femineae 10-14 mm longae tubo 0.5-1.4 mm dense piloso pilis crassis subconicis obtusis vel obtusissimis 0.1-0.5(-0.8) mm et parvis vel sursum raris glandulis capitatis 0.05-0.1 mm. Lamina crassiuscula elliptica vel anguste elliptica 2-3.5 mm lata, 2-3-dentata, 5-7-nervata, basi extus parce pilosula et parvis glandulis 0.05-0.07 mm basi conicis, interdum sursum etiam parvis glandulis. Achaenia marginalia 2-2.5(-3) x (1.1-)1.5-2 mm obovato-triangulata basi acuta callosa apice obtusa dorso convexo, interiora oblonga 2.2-2.5 x 1-1.1 mm quadrangulata. Corollae masculae 6-8 mm, tubo 2.2-3 mm longo angusto sursum et basi limbi parvis pilis crassiusculis obtusis vel attenuatis et acutis 0.05-0.3(-0.8) mm interdum parvis glandulis 0.04-0.07 mm; lobis triangularibus 1-1.2 mm altis margine incrassato longe denseque papilloso, abaxiale glabris. Antherae 2.3-2.7 mm longae basi sagittatae appendice apicali ovata subacutata 0.4-0.6 mm. Nectarium 0.7-0.8 mm tubulosum denticulatum.

Typus: COLOMBIA, Cauca: Cordillera Central, western drainage, Páramo de Moras, 3600 m altitude, caulirosula 1.4 m high with yellowish appearance, leaves greenish-cinereous, the indument light yellowish, hairs of the sheaths pale yellowish, inflorescences yellowish, surpassing a little the leaves, ligules bright yellow,

ligular circle 35-40 mm diameter, disc convex, 17-20 mm diameter, corollas yellow, pales brownish barbate, 19 Mar 1973, J. Cuatrecasas & Carlos Lehmann 28638; US, holotypus; COL, isotype. Id., Eastern drainage of Cordillera Central, Páramo de Moras, 3690 m altitude, caulirosetta, trunk 60 cm high, rosette whitish-greenish-yellowish, inflorescences yellowish, surpassing the leaves, ligular circle 30-34 mm diameter, disc 15-17 mm diameter, trunk below the apex 4.5 cm diameter, resin dripping, hyaline, 19 Mar 1973, Cuatrecasas & Carlos Lehmann 28631; COL, US.

ESPELETIA SCHULTZII var. *BRACILOBATA* Cuatr. var. nov.

Lamina foliorum subobovato-oblonga subite acutata basim versus angustata, coriacea, crassa, albo lanato induta, 25-42 x 4-6 cm, supra basim ad 1.5-2.2 cm latam angustata, ratio 5-7.3:1, nervis secundariis plerumque angulo 50-55° ascendentibus, 6-8 (5-10) mm inter se distantibus, vagina 3-7 x 2.5-4 cm.

Inflorescentiae robustissimeae 80-120 cm longae, axe basi ad 2.5 cm diametro, 47-70 capitula ferentes, 5-6 paribus paracladiorum oppositorum plerumque ramosorum. Bractee foliaceae oblongo-ellipticae vel supremae oblongo-ovatae amplectentes, sed in 1-3 paribus proximalibus, bractea una vel ambae oblongo-obtrulatae profunde conspicueque 3-2 lobatae, 8-17 x 2.5-9 cm, lobis 1-6 cm longis centrali longiore lateralibus patulis.

Capitula ligulis amotis 20-25 mm ampla 371-387 flores ferentia, circulo ligularum 30-35 mm disco 16-18 mm diametro; flores radii 187-207, corolla lutea, 14-16 mm longa, tubulo 2-2.5 mm dense piloso et parce glanduloso, lamina lineari 0.8-1 mm lata; flores disci 180-184, corolla lutea 7.5-7.8 mm, tubulo 3 mm longo sursum minute piloso et parce glanduloso, limbo tubuloso-infundibuliformi dentibus triangularibus 0.7-0.9 mm longis acutis glabris. Receptaculum plano-convexum glabrum.

Typus: VENEZUELA, Trujillo: Paramito, above Jajó, towards Tuñame, rocky hills, 3100 m, trunk 20 cm, leaves very thick, soft and white, 29 Oct 1969, Cuatrecasas, Ruiz-Terán & López-Figueiras 28189; holotypus US; isotypus MERF. Los Pantanos near La Morita (Jajó-Tuñame), 2730 m, four specimens seen, near the road, 12 Jul 1971, Ruiz-Terán & López-Figueiras 2141; MERF, US, paratypi.

A very interesting variety characterized by having 1-3 pairs of bracts (both or one of each) deeply divided into 3 (or 2) triangular, patulous lobes, the medial longer. This feature has been observed by the author in several individuals at the collecting locality. Furthermore, the plants are unusually large with robust tall inflorescences, the heads having a glabrous receptacle and an extremely high number of flowers, from 370 to 387 of which 187 to 207 are ray-flowers. In typical *E. schultzii*, the number of flowers does not surpass 300, and the number of rays is no more than 120.

ESPELETIA SCHULTZII var. MUCURUBANA Cuatr. var. nov.

Forma a typica capitula minora magis numerosa, panícula magis ramosa pluris ramis ramulisque alternis, strictis, indumento brevior laxioreque differt. Lamina foliorum oblonga sursum leviter ampliata subite attenuato-acute basim versus leviter attenuata, 29-31 x 4.5-5.2 cm, ratio 5.7-6.2:1, supra basim 2-2.4 cm latam maxime angustata, nervis 5-9 mm inter se distantibus, angulo 45-50° (-60°) ascendentibus.

Inflorescentiae ad 150 cm longae fulvescentes parte vegetativa 3 paribus foliis sterilibus oppositis, parte florifera 2/3 longitudine usque 30-90 capitula ferenti, paribus paracladiorum paucissimis, paracladiis singulis numerosis, 7-12, omnibus ramosis 1-12 capitulis ferentibus, ramulis alternis vel oppositis, breviter villosulo-lanuginosis, strictis erectis.

Capitula ligulis amotis 12-20 mm diametro, 114-154 flores gerentia, circulo ligularum 22-30(-35), disco 9-13 mm diam; flores radii 42-45, corolla lutea 8.5-12 x 1.3-1.8 mm, tubo 1-1.3 mm; flores disci 70-110, corolla disci 4.8-5.3 mm.

Typus: VENEZUELA, Mérida: Base of Cordillera del Norte, between Mucurubá and Páramo de Mucurubá; subparamo slopes 3200-3300 m, 20 Oct 1969, Cuatrecasas, Ruiz-Terán & López-Figueiras 28148; holotypus, US; isotypus MERF.

ESPELETIA SCHULTZII var. SUBPARAMUNA Cuatr. var. nov.

Lamina foliorum adulta subobovato-oblonga apice angustata acutata, deorsum attenuata, 29-42 x 5-9 cm, ratio saepe 4.7-6.5:1, usque ad minimam latitudinem 1.8-2.5 cm latam supra basim angustata, dense subadpressequ albo-lutescente lanata, nervis subparallelis magis regularibus 6-12(-15) mm distantibus, 50-65° ascendentibus. Inflorescentiae robustae usque 1½ m longae, 27-35 capitulis 2-3 paribus foliorum sterilius 1-3 paribus paracladiorum et 1-6 singulis paracladiis alternis. Capitula 20-25 mm diam, circulo ligulari 30-42 mm diam. Flores 250-363, ligulis 100-150 in capitulo.

Typus: VENEZUELA, Trujillo: Páramo de La Cristalina, 2500-2600 m, on open clearings between thickets of Andean forest, large rosettes of yellowish white habit, leaves coriaceous, thick and soft, erect, adaxially yellowish white-woolly, abaxially greenish except on veins, juvenile leaves and central bud yellowish white woolly, inflorescences several simultaneously curved-ascendent, ligular circle 42-35 mm, disc 16-15 mm diameter, 17 Feb 1973, Cuatrecasas, Ruiz-Terán & López-Figueiras 28557; holotype US; isotype MERF.

WERNERIA CRASSA Blake subsp. ORIENTALIS Cuatr. subsp. nov.

Rhizoma verticale, parvis ramis radiatis ascendentibus cum foliis marcescentibus longe fulvo-barbatis, imbricatissimis, densissime crasseque tectis, distale dense rosulato-foliatis, saepe in pulvinos aggregatis. Folia linearia 22-28 mm longa uninervia; lamina viridis anguste oblongolanceolata subacuta, crassa, 9-12 mm longa, 1.5 mm lata, basi sine sensu gradatim in vaginam longissimam transiens; vagina linearis 1-1.4 (basi -2) mm lata, crassa hyalina, in sicco scariosa, dorsale costa rigidula eminenti, marginale copiosissime longeque antrorso-fulvo-barbata.

Capitula terminalia solitaria folia suprema rosulata excedentia, pedunculo ca 10 mm longo sursum incrassato obconico, tenuiter lanuginoso. Involucrum 13-15 mm altum viride, praeter basim leviter lanugineum glabrum. Phyllaria 13 crassiuscula inferne in tubum 6-7 mm longum connata, parte libera lanceolato-oblonga attenuata acutiuscula 7-8 x 2-2.2 mm, crassiuscula margine anguste scariosa apice minute papilloso-ciliata. Flores radii 13 ligulata; corolla alba glabra 14-15 mm longa, tubulo 3.6-4 mm longo angusto; lamina 2-2.3 mm lata, oblonga obtusa deorsum angustata, 4(-5) nervata. Stylus 6 mm, ramis crassis 1.2 mm longis, apice obtuso papilloso-stigmatico. Ovarium tenuiter 5-7-nervatum. Flores disci 48; corolla lutea glabra, 7 mm longa, tubulo 3 mm, limbo tubuloso 4 mm, lobis crassiusculis 1-1.2 mm longis. Antherae 1.5 mm longae; collum filamentum incrassatum 0.5 mm longum. Rami styli 1 mm apice truncato stigmato-papillato. Achaenia 3 mm longa. Pappus 5-6 mm longus stramineus setis strigosis pluriseriatis basi in callum annularem coalitis.

Typus: COLOMBIA, Cordillera Oriental, Alto del Almorzadero, vert. N, 3700-3800 m altitude, swampy paramo, rosettes caespitose, rays white, 28 Nov 1941, Cuatrecasas 13511; US, holotype; COL, F, isotypes. Other collections: Boyacá, Sierra Nevada del Cocuy, 4000-4300 m, 12 Sep 1938, Cuatrecasas & García 1486 (COL, US, F), 1516 (F); id., up to 4415 m, Cleef 8597 (U), 8736, 8762, 5784 (US).

This ssp. orientalis has the same habit as the ssp. crassa, but it differs basically from it in the smaller size. Its leaves are shorter and narrow, 20-30 mm long (25-50 mm in ssp. crassa); the involucre is narrower and shorter (up to 18 mm high in ssp. crassa), having 13 phyllaries instead of 19 as in crassa; the number of ray flowers is only 13 (in ssp. crassa 19-20), the ligules being shorter (10-11 mm in ssp. crassa); the disc corollas (7 mm) are also smaller than in ssp. crassa (8-11 mm). Subsp. orientalis represents the species in the Eastern Cordillera of Colombia, being characteristic of some very wet and swampy paramo meadows of high altitude.

LECTOTYPES IN THE LOBELIACEAE
HAWAIIAN PLANT STUDIES 91

Harold St. John
Bishop Museum, Box 19000A, Honolulu, Hawaii, 97818, USA.

Since no types were indicated, it has been necessary to choose lectotypes for certain members of the Lobeliaceae in the Hawaiian flora.

Clermontia paradisica E. Wimm., Engler's Pflanzenreich IV, 276b, heft 107, 761-762, 1953.

Lectotype: Hawaiian Islands, Hawaii Island, Kohala Mts., along ditch trail, Pololu-Honokanenui, open forest and small gulches, Feb. 18, 1952, O. Degener & A. Greenwell 21,879 (BISH), here designated.

Wimmer based his species upon four collections, without indicating a holotype. Of the four numbers three are present in the Bishop Museum, and these were all redetermined by J. F. Rock as C. parviflora Gaud. The writer agrees that no. 21,880 is exactly C. parviflora, but the other two represent a different species, C. paradisica. For this species, no. 21,879 is here chosen as the lectotype.

Clermontia parviflora Gaud., var. intermedia Skottsb., Göteborg. Bot. Trädg., Meddel. 15: 489-490, 1940.

Lectotype: Hawaiian Islands, Hawaii Island, Kohala Mts., Upper Hamakua Ditch Trail, between Koiawe and Alakahi valleys, Sept. 7, 1938, L. M. Cranwell, Selling & Skottsberg 3,149, here designated.

Skottsberg based his variety upon four syntypes, without any choice of a holotype. The number here chosen has two good branches, with flowers and fruit.

Cyanea angustifolia (Cham.) Hbd., var. tomentella Hbd., forma subpubescens E. Wimm., Engler's Pflanzenreich IV, 276b, heft 106, 71, 1956.

Lectotype: Hawaiian Islands, Oahu Island, Waianae Mts., Kukuiala Valley, 1,100-1,300 ft alt., Sept. 16, 1933, N. H. Krauss (BISH).

Of the two specimens cited by Wimmer, the Krauss collection is the most complete, so it is here chosen as the lectotype.

西藏苦苣苔科新植物

王文采

(中国科学院植物研究所)

TAXA NOVA GESNERIACEARUM E FLORA TIBETICA

Wang Wen-tsai

(Institutum Botanicum Academiae Sinicae)

[Translated by Hayden M. Wetzel (1514 Seventeenth Street, N.W., #108, Washington, D.C. 20036) and Laurence E. Skog (Department of Botany, Smithsonian Institution, Washington, D.C. 20560), from the Chinese originally published in Acta Phytotaxonomica Sinica 17(1): 110-111, 1979. This translation was done with the kind permission of the author; publication was made possible by the Elvin McDonald Research Fund of the American Gloxinia and Gesneriad Society, Inc.

This is the first of two planned translations of articles by Wang Wen-ts'ai describing Chinese Gesneriaceae. The more extensive study "Notulae de Gesneriaceis Sinensibus" (Acta Phytotax. Sin. 13(2,3) 1975) will appear in two parts subsequently.

The Wade-Giles system of transliteration has been used throughout. The author's name is properly spelled Wang Wen-ts'ai; future publications from China will use the pinyin system of Romanization, in which the name will be written Wang Wen-cai.]

The Narrow linear-leaved *Aeschynanthus*, var. nov. Figure 1:2

Aeschynanthus linearifolius C. E. C. Fisch. var. *angustissimus* W. T. Wang, var. nov. [Acta Phytotax. Sin. 17(1): 110, 1979].

A var. *linearifolio* differt caulibus patente hirtellis, foliis linearibus 4-7 mm latis 7.6-12.4 cm longis.

Me-t'uo (Metuo), Ni-ke to Han-mi, 2200 m above sea level, on rocks in a broad-leaved forest on a

mountain slope, liana, flower red, 3 August 1974 Ch'ing-Tsang Expedition (Chinghai-Tibet Exped.) 3948 (Type, kept in the herbarium of the Botanical Institute of the Academia Sinica, Typus in herbario Instituti Botanici Academiae Sinicae conservatur).

The Me-t'uo *Lysionotus*, sp. nov. Figure 1:3

Lysionotus metuoensis W. T. Wang, sp. nov. [Acta Phytotax. Sin. 17(1): 110, 1979].

Affinis *L. wardii* W. W. Smith, sed foliis linear-oblongis utrinque dense pubescentibus 2.4-3.5 cm longis 4-7 mm latis margine supra medium laxe denticulatis, pedunculis brevioribus circ. 10 mm longis, calyce majore 15-20 mm longo extus dense pubescenti ad 3-3.5 mm supra basin 5-partitis, segmentis anguste lanceolatis 12-16.5 mm longis differt.

Epiphytic secondary shrub. Stem ca. 34 cm long, with dense and patent puberulence. Leaves opposite, on extremely short petioles, coriaceous, elongate oblong or nearly linear, 2.4-3.5 cm long, 4-7 mm broad, margin above the middle sparsely denticulate or nearly entire, both sides densely puberulous, lateral veins obscure. Cyme of 2 flowers; peduncles ca. 10 mm long, with pedicels densely pubescent, pedicels nearly as long as peduncles; calyx 15-20 mm long, 5 lobes divided to 3-3.5 mm from the base, outside densely puberulous, the lobes narrowly lanceolate, 12-16.5 mm long; corolla white, 4.2-5 cm long, outside with sparse pubescence, inside glabrous, tube 2.4-3.5 cm long, upper lip ca. 3 mm long, of two shallow lobes, lower lip 8-10 mm long, of three shallow lobes; fertile stamens 2, borne 16 mm above the base of the corolla tube, 10-14 mm long, glabrous; staminodes 3, 4-7 mm long; disc annular, ca. 2.5 mm tall, margin sharp-toothed, glabrous; pistil 2-3 cm long, ovary linear, with extremely sparse puberulence.

Me-t'uo (Metuo), mountains behind Lao Me-t'uo, 1300 m above sea level, epiphytic on trees in a broad-leaved forest on a mountain slope, 24 August 1974, Ch'ing-Tsang Expedition (Chinghai-Tibet Exped.) 4522 (Type, kept in the herbarium of the Botanical Institute of the Academia Sinica, Typus in herbario Instituti Botanici Academiae Sinicae conservatur); Me-t'uo, Tang-pen to Mi-jih, Ch'ing-Tsang Expedition. 5006.

This species is close to L. wardii W. W. Smith, but it can be distinguished by its leaves which are narrow and long, elongate oblong, and both sides densely puberulent, the pedicels relatively short, and the calyx relatively large.

The Joined-bracted Chirita, sp. nov. Figure 1:1

Chirita infundibuliformis W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 17(1): 111, 1979].

Species foliis basi valde obliquis uno latere late cuneatis altero latere auriculatis, bracteis in involucrium infundibuliforme connatis insignis.

Caules circ. 12 cm alti, ut petioli pedunculique dense villosi.* Folia opposita; laminae oblique ellipticae vel ovatae, 3.5-8.5 cm longae, 2-5 cm latae, acuminatae, margine irregulariter denticulatae, supra dense puberula. Cymae 1-2-florae; involucrium atropurpureum, circ. 1.6 cm altum, 2.2 cm diam., extus puberulum; flores brevissime pedicellati; calyx campanulatus, circ. 2.5 cm longus, ad medium 5-partitus, extus dense puberulus; corolla purpurea, circ. 4.8 cm longa.

Perennial herb. Stem ca. 12 cm tall, with petioles, peduncles entirely covered with a dense brown pubescence.* Leaf-blades opposite, two pairs borne at the tip of the stem, the leaves oblique elliptic or oblique ovate, 3.5-8.5 cm long, 2-5 cm broad, apex acuminate, base broadly cuneate on one side, on the other side auriculate, margin unequally denticulate, surface densely puberulent, below a network of pubescent parallel veins, lateral veins ca. 7 on each side; the petioles 1-2.2 cm long. Cymes of 1-2 flowers; peduncles ca. 3.4 cm long; involucre funnel-form, purple, ca. 1.6 cm long, diameter ca. 2.2 cm, outside puberulent; the calyx campanulate, ca. 2.5 cm long, of five lobes divided to the middle, outside densely puberulent, lobes triangular; corolla purple-red, ca. 4.8 cm long, adaxial side with sparse short hairs, inside glabrous, the tube ca. 4 cm long, upper lip ca. 6 mm long, of two shallow lobes, lower lip ca. 8 mm long, of three deep lobes; fertile stamens 2, ca. 11 mm long, the filaments below the middle geniculate and swollen, with small glandular-bodies on them; staminodes 2, ca. 5 mm

*Sic; differs from the corresponding Latin/Chinese description.

long; disc annular, ca. 2 mm tall; the pistil ca. 2.8 cm long, linear, stigma ca. 6 mm long, of two deep lobes.

Me-t'uo (Metuo), neighborhood of Teh-erh-kung, 1700 m above sea level, at the edge of a broad-leaved forest on a mountain slope, 20 August 1974, Ch'ing-Tsang Expedition (Chinghai-Tibet. Exped.) 4437 (Type, kept in the herbarium of the Botanical Institute of the Academia Sinica, Typus in herbario Instituti Botanici Academiae Sinicae conservatur).

This species has the leaf base extremely oblique, the inflorescence bracts connate into a funnelform involucre, which is its unique characteristic, and by which it can be distinguished from the other species of this genus in this country.



Ill. 1 1. Chirita infundibuliformis W. T. Wang 2. Aeschynanthus lineari-folius C. E. C. Fisch. var. angustissimus W. T. Wang; 3. Lysionotus metuoensis W. T. Wang (All represent the upper stem of the plant, the original larger).

(Drawn by Feng Chin-yung)

Houstonia pusilla in Maryland and Virginia

Clyde F. Reed

Houstonia pusilla Schoepf (H. patens Ell.) is a rather small version of our common spring bluet. However, it has a more southern range, reaching its northernmost localities in northeastern Maryland.

In southeastern Virginia, it may be native from the south and that may be its natural northern limit. Collections have been seen from Nansemond, Southampton, Greenville, Amelia and Appomattox Counties, Virginia.

More northern localities in Maryland may have been introduced along with grass seed. In 1951 patches of H. pusilla were found in open wastes near Severna Park in Anne Arundel County, Maryland (April 11, 1951. Reed 23962). This area had been recently graded and seeded with grass.

More recently in 1978, specimens of H. pusilla were handed in to the Botany Department at the University of Maryland in a student's collection (Mary McGuirk), collected on her parent's farm along banks of a stream in open pasture, Thomas Run, 3 mi. E of Hickory, Harford County, Maryland. These specimens were referred to Dr. Edward Terrell (USDA, Beltsville, Md.) who verified the specimens. On May 2, 1979, Dr. Terrell and myself visited the McGuirk Farm along Pennington Road at Thomas Run, and found an abundance of H. pusilla scattered but well-established over a large portion of a permanent pasture. It could well have been introduced a few years ago when the pasture was seeded with grass seed which presumably came from "The South". Collected specimens from the May 2, 1979 visit: Reed 103546 (Reed Herb.) and Ed. Terrell 4997 (US).

This small bluet, 2-5 cm. tall with beautiful blue flowers, is probably more abundant in northern pastures and by-ways where grasses are sown and should be sought in the more bare areas among the grassy patches, especially from late March to mid-April; the May 2 plants were all in fruit.

Reed Herbarium,
10105 Harford Road,
Baltimore, Maryland
21234

NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXIII

Harold N. Moldenke

ERIOCAULON AQUATILE f. *VIVIPARUM* Mold., f. nov.

Haec forma a forma typica speciei capitulis maturis viviparis recedit.

This form differs from the typical form of the species in having some or all of its fruiting-heads viviparous.

The form is based on *S. A. Mori, R. M. King, T. S. dos Santos, and J. L. Hage 12515*, collected in campo rupestre on the Pico das Almas, 18 km. "SNW" of Rio de Contas, at an altitude of 1300--1600 m., Municip. Rio de Contas, 13°33' S., 41°57' W., Bahia, Brazil, on July 24, 1979. The collectors report the plants submerged in water.

LANTANA MAXIMA f. *ALBA* Mold., f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having white corollas.

The form is based on *G. Hatschbach 42140*, collected in invaded cerrado in the vicinity of Mambai, Goiás, Brazil, on March 13, 1979. The collector describes the plant as a shrub, 1.5 m. tall, with white corollas.

LEIOTHRIX PILULIFERA var. *HARLEYI* Mold., var. nov.

Haec varietas a forma typica speciei recedit foliis usque ad 15 cm. longis apicaliter subulato-acuminatis, pedunculis 14--16 cm. longis (vel longior?) filiformibus glabratiss, capitulis subrotundis 7 mm. diametro in fructo griseo-brunneis.

This variety differs from the typical form of the species in having the leaves to 15 cm. long, plainly subulate-acuminate at the apex, the filiform peduncles in fruit 14--16 cm. long, and the fruiting-heads subrotund, about 7 mm. long and wide, grayish-brown or fawn-color.

The variety is based on *R. M. Harley, S. J. Mayo, R. M. Storr, T. S. Santos, and R. S. Pinheiro in Harley 19328*, collected in open scrub on exposed sites with scattered low woodland in shelter of rocks, in an area of sandstone rocks with open sands in the flatter areas, on the summit of Morro do Chapéu, 41°12' W., 11°35' S., at an altitude of about 1000 m., about 8 km. southwest of the town of Morro do Chapéu to the west of the road to Utinga, Bahia, Brazil, on March 3, 1977.. The collectors describe the plant as an herb with rosettes of gray-green leaves and "scapes to 40 cm." tall, the involucre bracts fawn-color and the flowers whitish.

LIPPIA MORII Mold., sp. nov.

Frutex ramosus, ramis ramulisque gracillimis tetragonis minute

pilosulis; foliis decussato-oppositis numerosis parvis distincte petiolatis; petiolis filiformibus 1--2 mm. longis dense puberulis; laminis foliorum tenuiter chartaceis rotundo-spathulatis 5--10 mm. longis latisque utrinque dense puberulis apicaliter rotundatis basaliter cuneatis margine minutissime serrulato; inflorescentiis axillaribus brevissime spicato-capitatis; pedunculis filiformibus ca. 1 cm. longis puberulis; bracteis ovatis flavidulis apicaliter acutis dorso dense puberulis resinoso-glandulosis.

A branched shrub, about 2 m. tall; branches and branchlets very slender, obtusely tetragonal, minutely pilosulous, the angles prominently rounded-ridged; leaves usually borne on much abbreviated opposite twiglets, abundant, definitely petiolate; petioles filiform, 1--2 mm. long, densely puberulent; leaf-blades herbaceous, very thin-textured, not at all thickened or stiffened, round-spatulate, 5--10 mm. long and wide, apically rounded, basally cuneate, very densely velvety-pubescent on both surfaces, the upper surface not at all rugose, the venation not at all reticulate on either surface, the margin very obscurely serrulate from slightly below the middle (widest part) to the apex; inflorescence axillary, shortly spicate-capitate, solitary in the leaf-axils toward the tips of the branchlets and twigs, sparse; peduncles filiform, about 1 cm. long, puberulent; bracts yellowish, herbaceous, ovate-lanceolate, about 3 mm. long and wide, apically sharply acute, not acuminate, dorsally densely puberulent and somewhat resinous-glandular.

This species is based on *S. A. Mori, R. M. King, T. S. dos Santos, and J. L. Hage 12387*, collected on campo rupestre 4 km. north of Rio de Contas, at 1000 m. altitude, 13°32' S., 4°46' W., Municip. Rio de Contas, Bahia, Brazil, on July 21, 1979.

LIPPIA RIVALIS Mold., sp. nov.

Frutex, ramulis gracilibus densiuscule pilosulis in siccitate brunneis, foliis breviter petiolatis, laminis foliorum lanceolatis apicaliter acutis basaliter subacuminatis firme chartaceis supra rugosis subtus minutissime pilosulis perspicue reticulatis; inflorescentiis axillaribus capitatis 1--1.5 cm. longis paucifloris distincte pedunculatis.

A shrub, about 2 m. tall; branches and branchlets slender, brownish in drying, rather densely pilosulous or puberulous; leaves numerous, decussate-opposite, short-petiolate, brownish in drying; petioles very slender, about 5 mm. long, inconspicuously puberulous; leaf-blades firmly chartaceous, rather stiff, brown in drying, lanceolate, 3--3.5 cm. long, 1--1.5 cm. wide, apically acute, basally slightly acuminate, marginally serrulate from the apex almost to the base, very minutely pilosulous with bulbous-based hairs or glabrescent above, often decidedly rugose and scabridellous, minutely puberulent on the larger venation beneath; venation reticulum decidedly prominent and conspicuous beneath, the larger parts usually subimpressed above; inflorescence axillary, capitate, short-pedunculate, 1 or 2 per leaf-axil toward the tips of the branchlets, the heads rather few-flowered; peduncles

filiform, about 5 mm. long, pilosulous and slightly resinous-glandular; bracts herbaceous, ovate, about 3 mm. long and wide, apically obtuse, pilosulous; corolla white.

This species is based on *G. Hatschbach 42128*, collected on the banks of the Rio das Ondas, Municip. Barreiras, Bahia, Brazil, on March 12, 1979.

PAEPALANTHUS MACROCAULON var. *KINGII* Mold., var. nov.

Haec varietas a forma typica speciei recedit bracteis involucribus lanceolato-ovatis atro-brunneis vel subnigris ca. 3 mm. longis apicaliter attenuato-acuminatis marginaliter albo-ciliatis.

This variety differs from the typical form of the species chiefly in having the involucrial bracts lanceolate-ovate, about 3 mm. long, very dark-brown or almost black, dorsally shiny, apically conspicuously attenuate-acuminate, and marginally more or less white-ciliate.

The variety is based on *S. A. Mori, R. M. King, T. S. dos Santos, and J. L. Hage 12478*, collected in wet places on campo rupestre on the Pico das Almas, 18 km. "SNW" of Rio de Contas, at 1600--1850 m. altitude, Municip. Rio de Contas, 13°33' S., 41°57' W., Bahia, Brazil, on July 22, 1979.

PAEPALANTHUS PIRESI var. *VILLOSUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis novellis densissime albo-villosis recedit.

This variety differs from the typical form of the species in having its new leaves and sheaths very densely white-villous with conspicuous, long, wide-spreading, stiff hairs.

This variety is based on *J. Murca: Pires 16097*, collected "sobre pedras de igarapé seco...sede da fazenda Rio Dourado", at about 52° W., 8° S., Pará, Brazil, on June 28, 1978. The collector notes that the inflorescences are white and the "folhas cinzento-esbranquiçadas".

STACHYTARPHETA CHAMISSONIS var. *BREVIBRACTEATA* Mold., var. nov.

Haec varietas a forma typica speciei recedit laminis foliorum parvioribus rotundato-ellipticis 1--2 cm. longis 1 cm. latis distincte petiolatis, spicis brevioribus usque ad 9 cm. longis, bracteis brevioribus ca. 3 mm. longis, pilis in ramis ramisque rhachideque caliceque densissimis et brevissimis.

This variety differs from the typical form of the species in its leaf-blades being much smaller, rounded-elliptic or subrotund, 1--2 cm. long, about 1 cm. wide, densely puberulent above and very short-pubescent beneath, distinctly petiolate, the inflorescences much shorter, only to about 9 cm. long, dense, the bracts very short, about 3 mm. long, the branchlets, rachids, and calyxes very densely and very shortly pubescent.

This variety is based on *H. S. Irwin, E. Onishi, S. F. da Fonseca, R. Souza, R. Reis dos Santos, and J. Ramos 25457*, collected on outcrops in an area of sandy and gravelly campo and cerrado on outcrops, at an altitude of 1050 m., about 25 km. northeast of

Patrocínio, Morro das Pedras, Minas Gerais, on January 28, 1970. The collectors describe the plant as a subshrub, about 1 m. tall, the calyx light yellow-green, and the corollas dark-red.

STACHYTARPHETA CHAMISSONIS var. *PARVIFOLIA* Mold., var. nov.

Haec varietas a var. *brevibracteata* recedit ramis ramulisque rhachideque caliceque dense albido-hispidulis bracteis 6--7 mm. longis.

This variety differs from var. *brevibracteata* Mold. in the branches, branchlets, calyxes, rachids, and lower leaf-surfaces being densely white-hispidulous, rather than puberulent or very short-pubescent, and the bracts in the inflorescences being 6--7 mm. long.

The variety is based on *Gates & Estabrook 176*, collected on a rocky outcrop near a stream on a gentle sandy slope, at 1500 m. altitude, Chapada dos Veadeiros, 5 km. east of Alto Paraíso, Municip. Alto Paraíso, 14° S., 47° W., Goiás, Brazil, on February 14, 1979. The collectors describe the plant as a branched shrub, bushy, to about 50 cm. tall, with the "sepals green with white hairs, corolla red with white style".

STACHYTARPHETA HATSCHBACHII Mold., sp. nov.

Frutex ramosus, ramulis gracilibus subtetragonis nigrescentibus minute pilosulis, foliis distincte petiolatis, petiolis ca. 1 cm. longis minutissime pilosulis nigrescentibus, laminis foliorum subcoriaceis ellipticis nigrescentibus plerumque falcato-curvatis plicatisque apicaliter rotundatis basaliter longiter attenuatis utrinque glabratis vel subglabrescentibus subtus dense impresso-punctatis, marginaliter serrulatis, spicis terminalibus 12--15 cm. longis multifloris densis nigrescentibus, rhachide minute puberulo, bracteis parvis lanceolatis ca. 3 mm. longis apicaliter acuminatis.

A branched shrub, about 1.5 m. tall; branches and branchlets slender, nigrescent in drying, subtetragonal and the angles definitely rounded-ridged, subglabrous or minutely pilosulous on two opposite sides; leaves small, decussate-opposite, nigrescent in drying, definitely and plainly petiolate; petioles about 1 cm. long, very minutely pilosulous; leaf-blades subcoriaceous, nigrescent in drying, elliptic, 2.5--3 cm. long, 1.5--2 cm. wide, mostly falcate-curved (at least in drying and pressing), apically rounded or obtuse, basally long-attenuate, marginally serrulate from slightly below the widest part to the apex, glabrate or subglabrescent on both surfaces or very minutely puberulous, densely impressed-punctate beneath; venation not conspicuous on either surface; inflorescence spicate, terminal, very shortly pedunculate, nigrescent throughout in drying, 12--15 cm. long, densely many-flowered; rachis densely pilosulous or puberulent, the sympodia very short; calyx cylindric, about 1 cm. long, very minutely pilosulous; corolla violet.

This species is based on *G. Hatschbach & O. Guimaraes 42347*, collected on rocky cliffs at 1100 m. altitude, in the Serra do

Tombador, Municip. Morro do Chapéu, Bahia, Brazil, on July 15, 1979.

SYNGONANTHUS HUMBOLDTII var. *HUMILIS* Mold., var. nov.

Haec varietas a forma typica speciei statura perhumilior 5--7 cm. alta recedit.

This variety differs from the typical form of the species in its much lower stature, attaining a height of only 5--7 cm. when in full anthesis and/or fruit, with usually only a basal and single apical whorl of very small and very narrow leaves.

This variety is based on *Gerrit Davidse and Angel C. González 15961*, collected on a sandy savanna in an area of morichal and surrounding marshy grassland and sand dunes about 2 km. south of Caño La Cochina de La Pica along the main road south of Paso de San Pablo to the Rio Cinaruco, 6°42' N., 67°48' W., at an altitude of 70 m., Distrito Pedro Camejo, Apure, Venezuela, on March 2, 1979, and the type is deposited in my personal herbarium.

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NOTES ON THE GENUS *COELOCARPUM*

Harold N. Moldenke

This genus is the 46th genus treated by me in this series of notes, the previously treated genera being: *AVICENNIACEAE*: *Avicennia*; *VERBENACEAE*: *Acantholippia*, *Aegiphila*, *Amasonia*, *Baillonia*, *Bouchea*, *Burroughsia*, *Callicarpa*, *Casselia*, *Chascanum*, *Citharexylum*, *Cornutia*, *Diostea*, *Dipyrena*, *Hierobotana*, *Lippia*, *Neosparton*, *Parodianthus*, *Petitia*, *Petrea*, *Pitraea*, *Priva*, *Pseudocarpidium*, *Recordia*, *Rehdera*, *Rhaphithamnus*, *Stylodon*, *Svensonia*, *Tectona*, *Verbena*, *Vitex*; *ERIOCAULACEAE*: *Blastocaulon*, *Carpotepala*, *Comanthera*, *Eriocaulon*, *Lachnocaulon*, *Leiostrix*, *Mesanthemum*, *Moldenkeanthus*, *Paepalanthus*, *Philodice*, *Rondonanthus*, *Syngonanthus*, *Tonina*, *Wurdackia*. Others are in various stages of preparation.

In accordance with the statement of policies outlined in my "Fifth Summary of the *Verbenaceae*, *Avicenniaceae*, *Stilbaceae*, *Dicrastylidaceae*, *Symphoremaceae*, *Nyctanthaceae*, and *Eriocaulaceae*" (1971), pp. 771--801, the original spelling of scientific epithets is herein retained for accepted names and the acronyms employed for herbaria are those listed on pp. 795--801 (plus supplements) of that work.

COELOCARPUM Balf. f., Proc. Roy. Soc. Edinb. 12: 90. 1884.

Synonymy: *Coelocarpus* Balf. f., Trans. Roy. Soc. Edinb. 31: 235, pl. 79. 1888 [not *Coelocarpus* F. Muell., 1904, nor P. & K., 1966]. *Coelocarpus* "Balf. f. ex Briq." apud Angely, Cat. Estat. Gen. Bot. Fan. 17: 3, in syn. 1956. *Coelocarpus* Scott Elliot

apud Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 269, in syn. 1973.

Bibliography: Balf. f., Proc. Roy. Soc. Edinb. 12: 90--91. 1884; Balf. f., Trans. Roy. Soc. Edinb. 31: [Bot. Socotra] 233--235 & 417, pl. 79. 1888; Scott Elliot, Journ. Linn. Soc. Lond. Bot. 29: 43. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 578. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 158--159 (1895) and ed. 1, 4 (3a): [381]. 1897; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 105. 1901; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 431. 1904; Post & Kuntze, Lexicon 134. 1904; M. Kunz, Anatom. Untersuch. Verb. 66, 67, & 78, fig. 3. 1911; Stapf, Ind. Lond. 2: 255. 1930; Junell, Symb. Bot. Upsal. 1 (4): 46. 1934; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 105. 1941; Mold., Alph. List Inv. Names 21. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 53 & 92. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 578. 1946; Mold., Alph. List Inv. Names Suppl. 1: 8. 1947; H. N. & A. L. Mold., Pl. Life 2: 31. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 123, 124, & 184. 1949; Metcalfe & Chalk, Anat. Dicot. 1032 & 1040. 1950; Mold., Phytologia 3: 265--268. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 58. 1953; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956; Mold. in Humbert, Fl. Madag. 174: 3, 33--40, & 269, fig. 4. 1956; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 431. 1958; Durant & Jacks., Ind. Kew. Suppl. 1, imp. 3, 105. 1959; Mold., Phytologia 7: 80--81. 1959; Mold., Résumé 156, 158, 274, 408, & 454. 1959; Mold., Résumé Suppl. 1: 8. 1959; Anon., Assoc. Étud. Tax. Fl. Afr. Trop. Ind. 1959: 53. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 578. 1960; Mold., Biol. Abstr. 35: 1688. 1960; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 795. 1962; Hocking, Excerpt. Bot. A.4: 592. 1962; Dalla Torre & Harms, Gen. Siphonog., imp. 3, 431. 1963; F. A. Barkley, List Ord. Fam. Anthoph. 75 & 154. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 262. 1966; G. Taylor, Ind. Kew. Suppl. 13: 33. 1966; Rouleau, Guide Ind. Kew. 46 & 352. 1970; Mold., Fifth Summ. 1: 213, 261, 265, 467, & 468 (1971) and 2: 756 & 875. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 269. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 659. 1973.

Unarmed hairy subshrubs, shrubs, or low trees, mostly 0.4--1 m. tall, usually much branched; stems and branches slender, tetragonal or subterete, usually more or less grayish-pubescent or -strigose when young, often brittle; leaves simple, exstipulate, deciduous, decussate-opposite, the blades chartaceous or membranous, marginally mostly more or less crenate or serrate, more rarely subentire, sessile or short-petiolate; inflorescence spicate or subracemiform, indeterminate, mostly short, terminal, sometimes glandular-pubescent, usually many-flowered, often dense during anthesis and later elongating; true prophylla apparently absent; flowers small, borne in the axils of small or minute bractlets, usually pedicellate, hypogynous, varying from alternate to subopposite or approximate on the rachis; calyx gamosepalous, tubular-campanulate or obconic, membranous, usually 5- [sometimes 6-]

costate, slightly zygomorphic, the ribs ending in mucros or apiculations at the apices of the 5 teeth of the rim; corolla gamopetalous, infundibular, white or yellow, usually tinged with rose or violet, its tube cylindric, straight, apically ampliate, the limb 5-parted, patent, mostly more or less 2-lipped, the lobes obovate, apically obtuse, usually somewhat unequal with the 2 posterior ones smaller; stamens 4, didynamous, included, inserted near or above the middle of the corolla-tube; filaments filiform, short; anthers basally cordate, unappendaged, the thecae divergent; pistil solitary, included; style capillary; stigma peltate, unequally and very shortly 2-parted, the anterior lobe larger and stigmatiferous, the posterior lobe small, erect, smooth; ovary superior, entire, subglobose, compound, "formed by 7 two-celled carpels" [Briquet; typographic error for "2"?], 4-celled, each cell 1- [or "7" apud Briquet] ovulate; fruiting-calyx spreading-cupuliform, shorter than the fruit it subtends; fruit drupaceous, with a juicy exocarp and a hard, bony endocarp; pyrenes 2, each 2-celled and 2-seeded, separated by a central gap; seeds exalbuminous.

This is a small genus of 5 known species native to Socotra, Somalia, and Madagascar. The type species is *C. socotranum* Balf. f. The spelling, *Coelocarpus*, for the generic name is adopted by Scott Elliot (1891), Jackson (1893), Briquet (1895), Kunz (1911), Dalla Torre & Harms (1904), and Junell (1934), although Balfour's original spelling was *Coelocarpum* (1884), the assertion of Jackson and Dalla Torre & Harms to the contrary notwithstanding. Airy Shaw lists a "*Coelocarpus* P. & K." as a synonym of *Coilocarpus* F. Muell. in the *Chenopodiaceae*, but Post & Kuntze, in the reference cited by him, plainly accredit the name to Mueller. Durand (1901) plainly indicates that the spelling "*Coelocarpus*" is an error ("sphalm.") and Briquet is authority for the assertion concerning the 7 carpels and 7 ovules in each ovary-cell -- a condition unique in the family, if true. It seems more probable that the "7" is a typographic error for "1" or "2".

It should be noted that the Scott Elliot (1891) reference in the bibliography above is often mis-accredited to Balfour. The original Balfour description (1884) is dated "1883" by Scott Elliot (1891) and reads as follows: "Calyx tubuloso-campanulatus, membranaceus, 5-costatus costis in mucrones productis, fructifer patens cupularis drupaque brevior. Corollae tubus cylindraceus, aequalis; limbus patens, 5-fidus, lobis oblongis obovatis obtusis parum inaequalibus, 2 posticis minoribus. Stamina 4, didynama, supra medium tubum affixa, inclusa, filamentis brevibus; antherae cordiformes, inappendiculatae, loculis divergentibus. Ovarium integrum, 4-loculare, loculis 1-ovulatis; stylus inclusus apice brevissime bifidus, lobo antico majore stigmatoso, postico erecto levi. Drupa succosa calyci patenti imposita, endocarpio osseo, pyrenis 2 2-locularibus lacuna intermedia separatis. Semina exalbuminosa. -- Frutex pubescens, inermis. Folia opposita, elliptica, crenata, venulis subtus prominentibus.

Racemi terminales breves. Flores parvuli in axilla bracteae minutae breviter pedicellati, ebracteolati, secus rhachin alterni v. suboppositi, approximati. Genus monotypicum *Citharexylum* Americano generi arcte affine."

In his 1888 work Balfour elaborates on this as follows: "A monotypic genus undoubtedly referable to the tribe *Verbeneae*, and decidedly Lantanoid in habit. But, from the genus *Lantana* and its allies the 4-celled ovary and the fruit separate it, and its closest affinity appears to be with the tropical and subtropical American genus *Citharexylum*, the species of which, twenty in number, are spread from Brazil and Bolivia to Mexico.

"The technical characters by which it is separated from its American ally are found in the androecium. In *Citharexylum* the connective is enlarged behind the anther, forming a sort of cushion upon which the parallel lobes lie, and this cushion often forms a small apical antherine appendage. In the Socotran plant the anthers are minute, divergent at the base, without an enlarged connective. In other characters the genera agree well, -- in inflorescence, calyx, corolla, ovary, and most remarkably in the fruit, which is somewhat peculiar, having in the centre between the two-celled pyrenes a cavity larger than the loculi. This has given the name to our genus. In habit there is a slight difference..... Altogether the affinity of the Socotran and the American plant is very close, so close indeed that, apart from their distribution, one would probably have been inclined to regard the Socotran plant as a *Citharexylum*. But the antipodean distribution makes the union at present less advisable, when there are such differences in the staminal whorl.

"Whether congeneric or not the affinity is clear, and is interesting from the point of view of geographical distribution, as it adds another to those instances of species endemic in the Indian Ocean islands which find their nearest allies in new world or almost antipodean forms of either the same or closely related genera."

In connection with my adoption of Balfour's original spelling of the generic name, it is interesting to note that no less a modern authority as Rupert Barneby, in a letter to me dated August 29, 1979, says, in part: "I fully agree with you that it is illegal and incidentally arrogant to alter the original spelling of generic names".

Coelocarpum socotranum is apparently endemic to the island of Socotra; *C. africanum* is endemic to Somalia. The remaining species, all endemic to Madagascar, may be distinguished as follows:

1. Leaves sessile or subsessile, the blades shallowly and obscurely crenulate apically or subentire.....*C. swinglei*.
- 1a. Leaves petiolate, the blades plainly serrate or crenate.
2. Leaf-blades large, ovate, to 6.5 cm. long and 3.2 cm. wide.....*C. humberti*.
- 2a. Leaf-blades small, oblong or oblong-elliptic to linear-lanceolate, sub lanceolate, or subob lanceolate, to 3.5 cm. long and 1.5 cm. wide.

3. Inflorescence densely glandulose.....*C. glandulosum*.
 3a. Inflorescence not glandulose.....*C. madagascariense*.

COELOCARPUM AFRICANUM Mold., Phytologia 7: 80--81. 1959.

Bibliography: Mold., Phytologia 7: 80--81. 1959; Mold., Résumé Suppl. 1: 8. 1959; Anon., Assoc. Étud. Tax. Pl. Afr. Trop. Ind. 1959: 50. 1960; Mold., Biol. Abstr. 35: 1688. 1960; Hocking, Excerpt. Bot. A.4: 592. 1962; G. Taylor, Ind. Kew. Suppl. 13: 33. 1966; Mold., Fifth Summ. 1: 213 (1971) and 2: 875. 1971.

Material of this species has been misidentified and distributed in some herbaria as "*Premna* sp. nov.?"

Citations: SOMALIA: Bally 11144 (K--type, N--isotype), 11236 (K, N); Glover & Gilliland 742 (K); E. F. Peck Y.119 (K).

COELOCARPUM GLANDULOSUM Mold., Phytologia 3: 265--266. 1950.

Bibliography: Mold., Phytologia 3: 265--266. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 58. 1953; Mold. in Humbert, Fl. Madag. 174: 34, 35, 38--39, & 269, fig. 4 (7--9). 1956; Mold., Résumé 156 & 454. 1959; Mold., Fifth Summ. 1: 261 (1971) and 2: 875. 1971.

Illustrations: Mold. in Humbert, Fl. Madag. 174: 35, fig. 4 (7--9). 1956.

Recent collectors describe this endemic southwestern Madagascan plant as suffrutescent, 4--6 dm. tall, and have encountered it on old fixed sand dunes and in limestone areas ["sables et calcaires"] and along roadsides among them, at 1--50 m. altitude, flowering in January, February, May, and from July to September. The corollas are said to have been "white" on Humbert & Swingle 5598, "pinkish-white" on Decary 9646, "rose-white" on Decary 2733 & 2907, and "blanc très légèrement rose ou violace" on Decary 8432, 9059, 9106, & 9161.

It should be noted here that the illustration in Humbert's Fl. Madag. (1956) is very misleading since the foliage as there depicted for *C. glandulosum* appears to be practically identical to that of *C. madagascariense*, when, in reality, there are considerable differences.

Material of *C. glandulosum* has been misidentified and distributed in some herbaria as *Priva* sp.

Citations: MADAGASCAR: Decary 2733 (F--photo of type, It--photo of type, N--isotype, N--photo of type, P--type, Z--photo of type), 2907 (N, P, W--2494702), 8432 (P), 9059 (P), 9106 in part (P), 9161 (N, P), 9646 (P); Humbert & Swingle 5598 (P, W--1528806).

COELOCARPUM HUMBERTI Mold., Phytologia 3: 266--267. 1950.

Bibliography: Mold., Phytologia 3: 266--267. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 58. 1953; Mold. in Humbert, Fl. Madag. 174: 34--38 & 269, fig. 4 (4--6). 1956; Mold., Résumé 156 & 454. 1959; Mold., Fifth Summ. 1: 261 (1971) and 2: 875. 1971.

Illustrations: Mold. in Humbert, Fl. Madag. 174: 35, fig. 4 (4--6). 1956.

Recent collectors have found this plant growing on or among gneiss or limestone rocks, in dry forests on limestone plateaus, and in xerophilous bushland, describing it as suffrutescent, 5--6 dm. tall. They have encountered it at altitudes of 200--1200 m., flowering and fruiting from August to February. The corollas are said to have been "white" on *Humbert & Swingle 5514*, "whitish or pale-violet" on *Humbert 12932*, and "whitish with a violet throat" on *Humbert 14292*. It is said to be employed locally as a tea and the only recorded vernacular name for it is "rombavola". It is apparently endemic to south-central and southwestern Madagascar.

Citations: MADAGASCAR: *Humbert 6882 bis* (B, P), 12475 (P), 12932 (P), 13869 (P), 14292 (F--photo of type, It--photo of type, N--isotype, N--photo of type, P--type, Z--photo of type); *Humbert & Swingle 5514* (N, P).

COELOCARPUM MADAGASCARIENSE S. Elliot, Journ. Linn. Soc. Lond.

Bot. 29: 43 [as "*Coelocarpus madagascariensis*"]. 1891.

Synonymy: *Coelocarpus madagascariensis* S. Elliot, Journ. Linn. Soc. Lond. Bot. 29: 43. 1891. *Coelocarpum madagascariensis* S. Elliot apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 105. 1901.

Bibliography: S. Elliot, Journ. Linn. Soc. Lond. Bot. 29: 43. 1891; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 105 (1901) and imp. 2, 105. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 53 & 92. 1942; Mold., Alph. List Inv. Names Suppl. 1: 8. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 123 & 184. 1949; Mold. in *Humbert, Fl. Madag.* 174: 34, 35, 39--40, & 269, fig. 4 (10--14). 1956; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 105. 1959; Mold., Résumé 156, 274, & 454. 1959; Mold., Fifth Summ. 1: 261, 467, & 468 (1971) and 2: 875. 1971.

Illustrations: Mold. in *Humbert, Fl. Madag.* 174: 35, fig. 4 (10--14). 1956.

An erect aromatic shrub or scabrous perennial herb, 5--8 dm. tall; branches dichotomous, ascending, scabrous, woody at the nodes; leaves decussate-opposite, very variable because of the greater or less development of the basal lobes, short-petiolate; leaf-blades mostly oblong or linear-lanceolate, 2--3 cm. long, 6--15 mm. wide, often subhastate with basal lobes, apically obtuse, hirsute on both surfaces; racemes terminal, 4--8 cm. long, the flowers developed alternately on the rachis; peduncles about 3 cm. long, slightly expanded below the flowers, articulate at the base; calyx infundibular, hairy, the tube about 4 mm. long, the teeth spreading, 5--6 mm. long, apically mucronate, hirsute; corolla small, infundibular, slightly larger than the calyx, white or yellow, tinged with rose or violet, villous in the throat, with short apically rounded segments; stamens 4, subdynamous; anthers cordate; fruit included by the mature calyx, ovoid, about 4 mm. long, dry, glabrous, somewhat bilobed.

This species is endemic to southwestern Madagascar and is based on *Scott Elliot 2342* from open sandy ground at Fort Dauphin. Recent collectors have encountered it on fixed sand dunes

along roadsides, bordering sandy roadsides, in open areas and on "pentes calcaires de les clairiens", at altitudes of 1--10 m., flowering in January, March to June, and August. The corollas are said to have been "white" on *Cloisel 20*, *Decary 2689* & *9569*, and *Humbert & Swingle 5350*, and "blanc très légèrement rose ou violacé" on *Decary 9106* in part. The plant is known locally as "amboebankibo", "ampembakibo", and "romba".

The *Decary 2907*, distributed as *C. madagascariense*, actually is *C. glandulosum* Mold.

Citations: MADAGASCAR: *Cloisel 20* (P); *Decary 2689* (P), *3596* (P), *3981* (P), *9106* in part (P), *9169* (W--2494777), *9569* (N, P, S); *Humbert & Swingle 5350* (B, N, P, W--1528568); *Scott Elliot 2342* (F--photo of isotype, It--photo of isotype, N--photo of isotype, P--isotype, Z--photo of isotype).

COELOCARPUM SOCOTRANUM Balf. f., Proc. Roy. Soc. Edinb. 12: 91. 1884.

Synonymy: *Coelocarpus socotranus* Balf. f., Trans. Roy. Soc. Edinb. 31: 235, pl. 79. 1888. *Coelocarpus socotranum* Balf. f. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 578. 1893. *Coelocarpus socotrinus* Balf. f. apud M. Kunz, Anatom. Untersuch. Verb. 78. 1911.

Bibliography: Balf. f., Proc. Roy. Soc. Edinb. 12: 91. 1884; Balf. f., Trans. Roy. Soc. Edinb. 31: [Bot. Socotra] 233--235 & 417, pl. 79. 1888; Scott Elliot, Journ. Linn. Soc. Lond. Bot. 29: 43. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 578. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 159. 1894; M. Kunz, Anatom. Untersuch. Verb. 66, 67, & 78, fig. 3. 1911; Stapf, Ind. Lond. 2: 255. 1930; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 53 & 92. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 578. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 124 & 184. 1949; Mold., Résumé 158 & 454. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 578. 1960; Mold., Fifth Summ. 1: 265 & 468 (1971) and 2: 875. 1971.

Illustrations: Balf. f., Trans. Roy. Soc. Edinb. 31: [Bot. Socotra] pl. 79. 1888; M. Kunz, Anatom. Untersuch. Verb. 78, fig. 3. 1911.

Balfour (1884) gives no specific description for this plant, referring simply to his generic description as serving also to describe the species. It is quoted by me in full under the generic discussion in the present paper. However, in his 1888 work he describes the species as follows: "Lignosus 3--4-pedalis cortice albo ramis ultimis brevibus puberulis; foliis 1--2 poll. longis 1/2 -- 3/4 poll. latis ellipticis v. oblongis v. subtrapeziformibus v. obovatis basi cuneatis petiolatis margine crenatis v. subserrulato-crenatis supra strigosis infra pubescentibus, petiolo 1/6 -- 1/4 poll. longo; spicis 3/4 -- 1 poll. longis; bracteis subulatis, pedicellis 1/12 poll. longis parum longioribus; calyce 1/6 poll. longo extus glanduloso costis strigosis intus sericeo-villoso; corollae tubo calyci aequali

extus glabro, limbo plerumque revoluto striguloso piloso; drupa ovoidea 1/4 poll. longa. Socotra. On the slopes of the hills at an elevation over 1000 feet. Not at all an uncommon shrub. B.C.S. nn. 299, 520. Distrib. Endemic."

Citations: SOCOTRA: Bayley-Balfour 299 (F--photo of cotype, It--photo of cotype, N--photo of cotype), 520 (F--photo of cotype, It--photo of cotype, K--cotype, N--photo of cotype, Z--cotype, Z--photo of cotype).

COELOCARPUM SWINGLEI Mold., Phytologia 3: 267--268. 1950.

Bibliography: Mold., Phytologia 3: 267--268. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 58. 1953; Mold. in Humbert, Fl. Madag. 174: 34--36 & 269, fig. 4 (1--3). 1956; Mold., Résumé 156 & 454. 1959; Mold., Fifth Summ. 1: 261 (1971) and 2: 875. 1971.

Illustrations: Mold. in Humbert, Fl. Madag. 174: 35, fig. 4 (1--3). 1956.

This endemic southwestern Madagascar species is known only from sand dunes near the sea, altitude 1--10 m., and has been collected in flower and fruit in August and December.

Citations: MADAGASCAR: Afzelius s.n. [20.12.1912] (S); Humbert & Swingle 5413 (F--photo of type, It--photo of type, N--isotype, N--photo of type, P--isotype, W--1528575--type, Z--photo of type).

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NOTES ON THE GENUS *CONGEA*

Harold N. Moldenke

In view of the excellent revision of this genus by my friend and colleague, Dr. Munir Ahmad Abid (1966), it would be presumptuous on my part to continue with my own long-planned monograph. However, it seems desirable to place on record here the extensive notes, chiefly bibliographic and horticultural, and records of herbarium material examined, assembled by me over the past fifty years. This, then, is the 47th genus on which I have written in the present series of notes in this journal. The herbarium acronyms hereinafter employed are the same as used by me in all of my extensive series of papers in this journal since 1933 and are fully explained in my Fifth Summary of the *Verbenaceae*..... (1971), pages 795--801.

CONGEA Roxb., Pl. Coromand. 3: 90, pl. 293. 1819.

Synonymy: *Roscoea* Roxb., Fl. Ind., ed. 1, 3: 54. 1832 [not *Roscoea* J. E. Sm., 1804]. *Calochlamys* Presl, Bot. Bemerk. 148. 1844 [not *Calochlamys* Miq., 1904, nor P. & K., 1966]. *Rocoea* Roxb. apud Schau. in A. DC., Prodr. 11: 624, sphalm. 1847. *Gonjea* Woodr., Gard. India, ed. 5, 420. 1889. *Calochlamis* Presl apud Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 100, in syn. 1921.

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In view of Munir's (1966) splendid and exhaustive treatment of the genus, especially as to its nomenclatural and taxonomic history, it seems pointless to give here more than supplementary comments.

Congea, as known now, is a small genus of 17 species, varieties, and named hybrids, native from Assam and Bangladesh, through Burma, Thailand, Malaya, and Indochina, east to Java, Sumatra, and Borneo, and north into southwestern China. *Roscoea* Roxb. is often included "in part" in its synonymy, but is actually based on *R. tomentosa* Roxb. (1814) and therefore nomenclaturally a true synonym of *Congea*. Some authors claim that the *Roscoea villosa* and *R. tomentosa* mentioned on page 95 of Roxburgh's work are composites, *Laggera aurita* Sch.-Bip. and *Conyza tomentosa*, respectively, but there seems to be no valid evidence for this assertion (see under *Congea tomentosa* in the present paper). *Roscoea* J. E. Sm., however, is a genus in the unrelated *Zingiberaceae*.

Meisner (1840) reduces not only *Roscoea* Roxb., but also *Sphenodesme* Jack and *Sphenodesma* Jack to synonymy under *Congea*, but *Sphenodesme* is a distinct genus and the other name is merely an orthographic variant. Bentham (1876) merely reduces "*Roscoae* sp. Roxb. Cat. Hort. Beng. 95, et Fl. Ind. iii.55" to *Congea*. Briquet (1895) reduces "*Roscoea* Roxb. z. T. [in part]" here. Spach (1840) also regarded *Sphenodesme* as a synonym of *Congea*.

Nair & Rehman (1962) describe the pollen grains of *Congea* as 3-nicolporate with more than one endocolpium per colpus.

Several species of *Congea* have been introduced into cultivation. A few have become naturalized in Central and South America

and Africa. According to Munir, no species of *Congea* is found wild in any part of peninsular India. The statement that *C. tomentosa* occurs wild on the Coromandel coast is an error based on a sentence apparently added to a subsequent reprint of Roxburgh's original description by the misplacement of an isolated printed line belonging to the description of another taxon entirely.

Briquet (1895) and Dalla Torre & Harms (1904) recognized only 4 species in the genus; Clarke (1885) accepted 4 species and 1 variety. Benthham (1876) recognized only 2 species.

It should be pointed out here that the *Calochlamys* of Miquel and of Post & Kuntze, referred to in the generic synonymy above, are synonyms of *Callichlamys* Miq. in the *Bignoniaceae*.

Congea is now classified in the family *Symphoremaceae* [*Symphoremataceae* of Airy Shaw, 1966], rather than in the true *Verbenaceae* as was formerly the practice. Besides Airy Shaw this disposition of the genus is also followed by Van Tieghem (1898) and Barkley (1965). Reichenbach (1828) and Dahlgren (1938) place it in the *Lamiaceae* [*Labiatae*].

It is also perhaps worth mentioning here that the Endlicher (1838) reference in the generic bibliography above is often cited as "1836-1856", the titlepage date, but the page here involved was actually issued in 1838. Similarly, Dop's 1915 work is often cited as "1914", but, according to a footnote on the titlepage, was not actually issued until 1915.

Howard (1974) reports the vascular bundles in *Congea* "fuse and invaginate at [the] ends". Turner (1967) reports a flower and leaf blight in the genus caused by the fungus, *Corticium solani* (Prill & Delacr.) Bourd. & Galz. Wellman (1972) tells us that when *Congea* branches "have aged the vine tips begin to show collapse and finally this natural condition results in dead ends. In the West Indies.....these.....vines often have old dead ends invaded by *Triblidiella*, which has a wide host range...A special situation occurs with regard to parasitism by the lichen [*Diplodia*] on the spectacular ornamental vine *Congea*. It was studied several times both in the West Indies and in Central America. The most showy part of the plant is the colored flower bracts and these had spotting from the lichen *Strigula* but no infections by the alga *Cephaleuros*. Under ample exposure all the true leaves of the vine are susceptible to algal infection."

Altschul (1973) reports an unidentified species of *Congea* [Native Collector 403, Roy. Forest. Dept. 3810] as having its roots used as a laxative. The species involved is probably *C. tomentosa* Roxb.

The *Colani* 4027, from Indochina, distributed as *Congea* and so determined by E. D. Merrill, is not a *Congea* nor is it anything symphoremaceous.

Type species: *Congea tomentosa* Roxb.

Excluded species:

Congea barbata Wall. = *Sphenodesme racemosa* (Presl) Mold.

Congea ferruginea Wall. = *Sphenodesme involucreta* (Presl) B. L. Robinson

- Congea involucreatum* Wall. = *Symphorema polyandrum* Wight
- Congea jackiana* Wall. = *Sphenodesme pentandra* Jack & *S. triflora* Wight
- Congea jackiana* var. *attenuata* Wall. = *Sphenodesme pentandra* var. *wallichiana* (Schau.) Munir
- Congea paniculata* Wall. = *Sphenodesme involucreata* var. *paniculata* (C. B. Clarke) Munir
- Congea pentandra* (Roxb.) Wall. = *Sphenodesme pentandra* var. *wallichiana* (Schau.) Munir
- Congea pentandra* Wall. = *Sphenodesme pentandra* var. *wallichiana* (Schau.) Munir
- Congea tomentosa* var. *pubescens* Hock. = *Sphenodesme involucreata* var. *pubescens* Mold.
- Congea unguiculata* Wall. = *Sphenodesme involucreata* (Presl) B. L. Robinson
- Congeeae* sp. W. Griff. = *Sphenodesme involucreata* (Presl) B. L. Robinson
- Congea* Roxb. sensu Wall. = *Sphenodesme* Jack
- Roscoea* "Roxb. in part" = *Sphenodesme* Jack
- Roscoea* J. E. Sm. -- in the *Zingiberaceae*
- Roscoea alpina* Royle -- in the *Zingiberaceae*
- Roscoea auriculata* K. Schum. -- in the *Zingiberaceae*
- Roscoea blanda* K. Schum. -- in the *Zingiberaceae*
- Roscoea brandisii* K. Schum. -- in the *Zingiberaceae*
- Roscoea capitata* J. E. Sm. -- in the *Zingiberaceae*
- Roscoea capitata* var. *purpurea* Hort. = *R. capitata* var. *purpurata* Hort. in the *Zingiberaceae*
- Roscoea capitata* var. *purpurata* Hort. -- in the *Zingiberaceae*
- Roscoea cautleoides* Gagnep. -- in the *Zingiberaceae*
- Roscoea chamaeleon* Gagnep. -- in the *Zingiberaceae*
- Roscoea debilis* Gagnep. -- in the *Zingiberaceae*
- Roscoea elatior* J. E. Sm. -- in the *Zingiberaceae*
- Roscoea exilis* J. E. Sm. = *R. purpurea* J. E. Sm., in the *Zingiberaceae*
- Roscoea flava* Merr. -- in the *Zingiberaceae*
- Roscoea gracilis* J. E. Sm. -- in the *Zingiberaceae*
- Roscoea humeana* Balf. & Sm. -- in the *Zingiberaceae*
- Roscoea intermedia* Gagnep. -- in the *Zingiberaceae*
- Roscoea longifolia* Baker -- in the *Zingiberaceae*
- Roscoea lutea* Hassk. -- in the *Zingiberaceae*
- Roscoea lutea* Royle = *R. elatior* J. E. Sm., in the *Zingiberaceae*
- Roscoea nigro-ciliata* Hassk. -- in the *Zingiberaceae*
- Roscoea pentandra* Roxb. = *Sphenodesme pentandra* var. *wallichiana* (Schau.) Munir
- Roscoea petiolata* Royle = *Cautleya petiolata* Baker in the *Zingiberaceae*
- Roscoea praecox* K. Schum. -- in the *Zingiberaceae*
- Roscoea procera* Wall. = *R. purpurea* J. E. Sm. in the *Zingiberaceae*
- Roscoea purpurea* J. E. Sm. -- in the *Zingiberaceae*
- Roscoea sikkimensis* Hort. = *R. purpurea* J. E. Sm., in the *Zingiberaceae*

Roscoeia spicata J. E. Sm. -- in the *Zingiberaceae*

Roscoeia tibetica Batalin -- in the *Zingiberaceae*

Roscoeia yunnanensis Loes. -- in the *Zingiberaceae*

CONGEA CHINENSIS Mold., *Phytologia* 2: 311--312. 1947.

Synonymy: *Congea chinensis* var. *chinensis* Munir, *Gard. Bull. Singapore* 21: 280. 1966.

Bibliography: Mold., *Phytologia* 2: 311--312. 1947; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 131 & 173. 1949; E. J. Salisb., *In. Kew. Suppl.* 11: 60. 1953; Mold., *Résumé* 169 & 439. 1959; E. H. Walker, *Bibliog. East. Asiat. Bot. Suppl.* 1: 235. 1960; Munir, *Gard. Bull. Singapore* 21: 267, 272, 275, 276, 278, 280--281, 294, 313, & 314, fig. 1, map 1. 1966; Mold., *Résumé Suppl.* 14: 3 & 8 (1960) and 15: 19. 1967; Mold., *Phytologia* 15: 269. 1967; Munir, *Gard. Bull. Singapore* 22: 157 & 158, fig. 1 F. 1967; Hocking, *Excerpt. Bot. A.* 13: 570. 1968; Mold., *Fifth Summ.* 1: 282, 288, & 468 (1971) and 2: 843. 1971.

Illustrations: Munir, *Gard. Bull. Singapore* 21: 281, fig. 1 (1966) and 22: 157, fig. 1 F. 1967.

Munir (1966) gives an excellent description and illustration of this taxon and comments that "Among all the species with four involucre bracts, *C. chinensis* is easily distinguished by its involucre bracts being united into a cup (up to 6 mm. long) at the base". He cites Tsai 25611 from Yunnan, China, and Kingdon-Ward 9049 & 20514 and Toppin 4225 & s.n. from Burma. He refers to Tsai 25611 as the type collection, but 52611 is the collection on which the species was based by me. The discrepancy probably is due to a stenographic transposition of numerals.

A supposed natural hybrid of this species with *C. connata* Fletcher is *C. Xmuniri* Mold., which see.

Citations: CHINA: Yunnan: Tsai 52611 (Cp--isotype, N--isotype, N--photo of type, S--type, Si--photo of type, W--1598328--isotype, Z--isotype, Z--photo of type).

CONGEA CHINENSIS var. *LATIBRACTEATA* Munir, *Gard. Bull. Singapore* 21: 280. 1966

Bibliography: Munir, *Gard. Bull. Singapore* 21: 267, 272, 275, 276, 278, 280, 282, & 313, fig. 1a, map 5. 1966; Mold., *Resume Suppl.* 14: 3. 1966; Munir, *Biol. Abstr.* 48: 5018. 1967; Mold., *Fifth Summ.* 1: 282 (1971) and 2: 843. 1971.

Illustrations: Munir, *Gard. Bull. Singapore* 21: 282, fig. 1a. 1966.

This variety is based on Lacey 6146 from Upper Burma and is not known to me from any other collection.

CONGEA CONNATA Fletcher, *Kew Bull. Misc. Inf.* 1938: 208--209. 1938.

Bibliography: Fletcher, *Kew Bull. Misc. Inf.* 1938: 208--209 & 440. 1938; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 60 & 92. 1942; Hill & Salisb., *Ind. Kew. Suppl.* 10: 58. 1947; Mold., *Phytologia* 2: 312. 1947; Mold., *Known Geogr. Distrib. Verbenac.*,

ed. 2, 137 & 173. 1949; Anon., Kew Bull. Gen. Index 82. 1959; Mold., Résumé 177 & 439. 1959; Munir, Gard. Bull. Singapore 21: 267, 273, 275, 276, 279, 294, 295, 313, & 314, fig. 5, map 6. 1966; Mold., Phytologia 15: 269. 1967; Mold., Résumé Suppl. 15: 19. 1967; Munir, Gard. Bull. Singapore 22: 157 & 158, fig. 1 H. 1967; Hocking, Excerpt. Bot. A.13: 570. 1968; Mold., Fifth Summ. 1: 295 (1971) and 2: 843. 1971; Mold., Phytologia 23: 424. 1972.

Illustrations: Munir, Gard. Bull. Singapore 21: 295, fig. 5 (1966) and 22: 157, fig. 1 H. 1967.

This species is based on Kerr 17913 from Thailand. Its calyx-tube being about 6 mm. long distinguishes it at once from the similar *C. siamensis* Fletcher. It has been found growing on the high banks of streams, flowering in February. The species is very closely related to *C. siamensis* Fletcher because of its involucre cup, but the cup in the latter species is only about 4 mm. long and the bracts are 3 [or "sub-4"] and pink-magenta in color.

Munir (1966) cites from Thailand, where *C. connata* is apparently endemic: Collins 569, Kerr 6810 & 17913, Smith 306, and Smitinand BKF.14087, the Collins and Smith collections being from Koh Chang Island. What appears to be a natural hybrid of this species with *C. chinensis* is *C. xmuniri* Mold.

Citations: KOH CHANG ISLAND: Collins 569 (W--1700614, Z).

CONGEA FORBESII King & Gamble, Kew Bull. Misc. Inf. 1908: 114. 1908.

Synonymy: *Congea velutina* "sensu Bakh." ex Munir, Gard. Bull. Singapore 21: 289, in syn. 1966 [not *C. velutina* Auct., 1968, nor Wight, 1849, nor "Wight sec. Dop", 1966]. *Congea forbesii* var. *forbesii* [King & Gamble] ex Munir, Gard. Bull. Singapore 21: 289. 1966.

Bibliography: King & Gamble, Kew Bull. Misc. Inf. 1908: 114. 1908; King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 866--867. 1908; Prain, Ind. Kew. Suppl. 4, imp. 1, 54. 1913; Dop, Bull. Soc. Bot. France 61: 321. 1915; H. J. Lam, Verbenac. Malay. Arch. 337--338 & 365. 1919; S. Moore, Journ. Bot. Lond. 63: Suppl. 82. 1925; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 60, 63, & 92. 1942; H. N. & A. L. Mold., Pl. Life 2: 59. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 138, 143, & 173. 1949; Prain, Ind. Kew. Suppl. 4, imp. 2, 54. 1958; Mold., Résumé 188 & 439. 1959; Munir, Gard. Bull. Singapore 21: 267, 270, 274, 276, 278, 289, 291--292, & 313, fig. 4, map 3. 1966; Mold., Résumé Suppl. 15: 19 & 20. 1967; Munir, Gard. Bull. Singapore 22: 157, fig. 1 D. 1967; Mold., Fifth Summ. 1: 323 & 469 (1971) and 2: 843. 1971.

Illustrations: Munir, Gard. Bull. Singapore 21: 291, fig. 4 (1966) and 22: 157, fig. 1 D. 1967.

The *C. velutina* Auct., referred to in the synonymy above, is a synonym of *C. griffithiana* Munir, while that of "Wight sec. Dop" is *C. tomentosa* var. *nivea* Munir; *C. velutina* Wight is a valid species.

Congea forbesii is apparently endemic to Sumatra. Munir (1966)

points out that "The presence of two linear-setaceous bracteoles between flower and involucre bracts is a special and distinct character found in no other species in the genus". Lam (1919) describes them as 4 in number, probably erroneously.

It is worth noting here that Meeuse regards *C. forbesii* as a synonym of *C. velutina* Wight.

The Moore reference (1925) in the bibliography of *C. forbesii* is sometimes inaccurately cited as authored by Rendle or as "S. Moore in Rendle". According to the table of contents of the issue involved the author was Moore alone.

Munir (1966) cites only the type collection of this species, *Forbes 1567*, from Sumatra.

Citations: GREATER SUNDA ISLANDS: Sumatra: *Forbes 1567* (Le--908141-62--isotype, N--isotype, N--photo of isotype, Vu--isotype, Vu--isotype, W--2317895--isotype, Z--isotype, Z--photo of isotype).

CONGEA FORBESII var. *RIDLEYANA* Munir, Gard. Bull. Singapore 21: 292--294, fig. 4a. 1966.

Synonymy: *Congea vestita* "Griff. in King & Gamble" ex Munir, Gard. Bull. Singapore 21: 292, in syn. 1966 [not *C. vestita* Griff., 1854, nor "Griff. sec. Dop", 1966]

Bibliography: King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 865. 1908; H. J. Lam, Verbenac. Malay. Arch. 338. 1919; Ridl., Fl. Malay Penins. 2: 640. 1923; Dop, Fl. Gén. Indo-chine 4: 911. 1935; Munir, Gard. Bull. Singapore 21: 267, 270, 275, 276, 278, 292--294, 313, & 314, fig. 4a, map 3. 1966; Mold., Résumé Suppl. 15: 11 & 12. 1967; Munir, Biol. Abstr. 48: 5018. 1967; Mold., Fifth Summ. 1: 305 & 323 (1971) and 2: 843. 1971.

The *C. vestita* Griff., referred to in the synonymy above, is a valid species, but that referred to Dop is in part *C. pedicellata* Munir and in part *C. tomentosa* var. *nivea* Munir.

Congea forbesii var. *ridleyana* is based on *Ridley 6993* from Arakuda Woods, Wellesley, Malaya, deposited in the Singapore Botanical Garden herbarium. Munir (1966) cites also *Dolman 21509*, *Kadir SF.35803*, *Padaicher s.n.*, *Spare 37314*, and *Wolfe & Kadir SF.21455* from Kedah and *Pool1 s.n.* from Sumatra.

CONGEA GRIFFITHIANA Munir, Gard. Bull. Singapore 21: 285--289, fig. 3. 1966.

Synonymy: *Congea villosa* Roxb. ex Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1479/B, hyponym. 1849. *Congea villosa* Wight apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893. *Congea villosa* (Roxb.) Wight ex Junell, Symb. Bot. Upsal. 1 (4): 133. 1934 [not *C. villosa* (Roxb.) Wight ex C. B. Clarke, 1885]. *Congea tomentosa* King & Gamble ex Mold., Résumé 275, in syn. 1959 [not *C. tomentosa* Roxb., 1819, nor "Roxb. sec. Dop", 1966, nor "Roxb. sec. Fletcher", 1966, nor "Roxb. sec. Wight", 1960, nor Hall. f., 1947, nor "(Roxb.) Wight" apud Munir, 1966]. *Congea tomentosa* var. *velutina* (Wight) Bakh. ex Mold., Résumé 275, in syn. 1959. *Congea tomentosa* "Roxb. sensu King & Gamble" apud

Munir, Gard. Bull. Singapore 21: 285, in syn. 1966. *Congea griffithiana* var. *griffithiana* Munir, Gard. Bull. Singapore 21: 285. 1966. *Congea velutina* Auct. ex Backer & Bakh., Fl. Java 3: 657, in syn. 1968 [not *C. velutina* Wight, 1849].

Bibliography: Hook., Bot. Misc. 286. 1830; Roxb., Fl. Ind., ed. 2, imp. 1 [Carey], 3: 55--56. 1832; Voigt, Hort. Suburb. Calc. 473. 1845; Wight, Icon. Pl. Ind. Orient. 4 (3): 15, pl. 1479/B. 1849; Schnitzl., Icon. Fam. Nat. Reg. Veg. 2: 137, Verbenac. [2]. 1856; Roxb., Fl. Ind., ed. 2, imp. 2 [Clarke], 476--477. 1874; C. B. Clarke in Hook. f., Fl. Brit. India 4: 603. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181. 1895; Gamble, Man. Indian Timb., ed. 2, imp. 1, 545. 1902; Brandis, Indian Trees, imp. 1, 513 & 514. 1906; King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 866. 1908; H. Hallier, Meded. Rijks Herb. Leid. 37: 86. 1918; Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 100 & 101. 1921; Gamble, Man. Indian Trees, ed. 2, imp. 2, 545. 1922; Ridl., Fl. Malay Penins. 2: 640. 1923; Junell, Symb. Bot. Upsal. 1 (4): 133--138 & 209, fig. 208 a--e, & 211--219. 1934; K. V. O. Dahlgren, Svensk. Bot. Tidsk. 32: 231. 1938; Fletcher, Kew Bull. Misc. Inf. 1938: 439 & 440. 1938; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 59--61, & 92. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595. 1946; Mold., Alph. List Inv. Names Suppl. 1: 8. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129, 136, 137, 160, & 173. 1949; Erdtman, Pollen Morph. Pl. Tax., ed. 1, imp. 1, 448. 1952; Steiner, Philip. Ornament. Pl. 148. 1952; Anon., Kew Bull. Gen. Index 82. 1959; Mold., Résumé 165, 175, 177, 179, 217, 275, 343, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595. 1960; G. L. Davis, Syst. Embryol. Angiosp. 271. 1966; Erdtman, Pollen Morph. Pl. Tax., ed. 2, 448. 1966; Mold., Résumé Suppl. 14: 3--5 & 8. 1966; Munir, Gard. Bull. Singapore 21: 259, 261--265, 267, 274--276, 278, 285--289, 313, & 314, fig. 3, map 3. 1966; Mold., Résumé Suppl. 15: 7, 11, & 20. 1967; Munir, Biol. Abstr. 48: 5018. 1967; Munir, Gard. Bull. Singapore 22: 157 & 158, fig. 1 E. 1967; Backer & Bakh., Fl. Java 3: 657. 1968; Corner & Watanabe, Illust. Guide Trop. Pl. 759. 1969; Mold. in Menninger, Flow. Vines 328. 1970; Brandis, Indian Trees, imp. 2, 513 & 514. 1971; Erdtman, Pollen Morph. Pl. Tax., ed. 2, imp. 2, 448. 1971; Mold., Fifth Summ. 1: 230, 282, 295, 300, 305, 361, 468, & 469 (1971) and 2: 843. 1971; Roxb., Fl. Ind., ed. 2, imp. 3, 476 & 477. 1971; Gamble, Man. Indian Timb., ed. 2, imp. 3, 545. 1972; Mold., Phytologia 23: 423 (1972) and 28: 449. 1974; Heslop-Harrison, Ind. Kew. Suppl. 15: 35. 1974; Mold., Phytologia 34: 269. 1976.

Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1479/B. 1849; Junell, Symb. Bot. Upsal. 1 (4): 134 & 136, fig. 208 a--e & 211--219. 1934; Munir, Gard. Bull. Singapore 21: 286, fig. 3 (1966) and 22: 157, fig. 1 E. 1967; Corner & Watanabe, Guide Trop. Pl. 759. 1969.

Munir (1966) gives an excellent and detailed description and history of this species and its nomenclature. He notes that "This

remarkable species often confused with *C. velutina* and *C. villosa* (Roxb.) is readily distinguished by its 4 involucre bracts which are quite free to the base and violet in colour and spatulate much narrowed toward the base. The two other species, *C. rockii* and *C. forbesii*, also with 4 bracteate involucres and no cup at the base, have elliptic to oblanceolate and more densely hoary whitish bracts". The species is native to southern Burma, Thailand, and Malaya and is widely cultivated there and elsewhere.

Erdtman (1966) has examined the pollen of a cultivated specimen of *C. griffithiana* from Singapore and describes the grains as 3-colporate (colpi more or less irregularly 3--4-orate), subprolate, about 35 x 30 μ , the sexine as thick as the nexine, reticulate, the muri simpli-duplibaculate, the colpi membranes psilate, the ora lalongate, not confined to the colpi membranes but forming more or less deep cuts in the adjoining mesocolpial exine.

Junell (1934) provides a very detailed analysis of the gynoecium morphology and embryology of this species. Recent collectors describe the plant as a shrub, 2.5 m. tall, or a large climbing vine, to 15 feet long, woody, much-branched, the stems to 7 cm. in diameter at breast height, the "entire inflorescence a deep rosy-pink", the flowers profuse, odorless, and the bracts pink or deep rosy-pink to purple. They have encountered it in hedges, "brushwoods", bamboo and evergreen forests, and near streams, at 98--1000 m. altitude, flowering from January to April and in October. Snan refers to it as "scattered in evergreen jungles" in Thailand. The corollas are said to have been "pink" on Rivera s.n. and Snan 99. Rivera refers to the plant as "an upland species". The only vernacular name recorded for it is "chingcha".

It seems most probable that the "*C. tomentosa*", described by Steiner (1952) from the Philippines, actually is *C. griffithiana*.

Munir (1966) cites the following collections: BURMA: *Griffith s.n.* [Wallich 1479/B & 6012/1]. THAILAND: Collins s.n., Curtis 2903 & 2962, Haniff 3853, Kerr 12470, 14762, 16656, & 17466, Smith 650, Snan 99, 913, & s.n. MALAYA: Kedah: Kadir SFN.35802, Sow 34622. CULTIVATED: Borneo: Tatong 2000. Java: Baker 36411, Bakhuizen 285, Durand 7204, Herb. Hort. Bot. Bogor XII.B.IX.53, XV.E.3, & XV.E.71, Visser C.90401. Philippine Islands: *Canicosa* 9636, Esben 34293, Philippine Nat. Herb. 92025, Rivera 33460, Steiner 22801 & 22931, Sulit 8313. Sumatra: Lörzing 11949. Zaire: Goossens 4511.

Material of this species has usually been misidentified and/or distributed in herbaria as *C. tomentosa* Roxb. or *C. velutina* Wight. On the other hand, the Erlanson 5368, Lindhard s.n., and Furtado s.n. [Nov. 15, 1929], distributed as *C. griffithiana*, actually are *C. tomentosa* Roxb., while Pételot 3852 is *C. tomentosa* var. *nivea* Munir.

It is most probable that the Zaire and Philippine collections cited below represent cultivated material or else material naturalized after cultivation or persistent after cultivation, but the accompanying labels do not indicate this.

Citations: THAILAND: Snan 99 [Herb. Roy. Forest Dept. 12168] (Z).

ZAIRE: *Goossens 4511* (N). PHILIPPINE ISLANDS: Luzon: *Pancho 204* (Au--11015). CULTIVATED: India: *Erlanson 5368* (N). Java: *Herb. Hort. Bot. Bogor. XII.B.IX.53* (Bz--26251, Bz, N), *XV.E.1* (Bz--26255, Bz, N), *XV.E.71* (Bz--26277, Bz, N), *XV.E.71a* (Bz--26278, Bz--26546, Bz, N). Malaya: *Herb. Mus. Bot. Upsal. s.n.* [Hort. Bot. Str. Settl. 13/10/32] (S). Philippine Islands: *Rivera s.n.* [Philip. Nat. Herb. 33460] (W--2212540); *Steiner 597* [Philip. Nat. Herb. 22931] (W--2212530). Samoan Islands: *Whistler W.843* (W--2738270). Sri Lanka: *Collector undetermined 125/58* (Pd, Pd); *Moldenke, Moldenke, Dassanayake, & Jayasuriya 28339* (Ld, Pd, W--2764545); *Moldenke, Moldenke, & Jayasuriya 28135* (Ac, Ld, Pd, W--2764404); *F. W. de Silva 3* (Pd).

CONGEA GRIFFITHIANA var. *ELLIPTICA* Munir, Gard. Bull. Singapore 21: 289--290, fig. 3a. 1966.

Bibliography: Munir, Gard. Bull. Singapore 21: 275, 278, & 289--290, fig. 3a. 1966; Mold., Fifth Summ. 1: 282 (1971) and 2: 843. 1971.

Illustrations: Munir, Gard. Bull. Singapore 21: 290, fig/ 3a. 1966.

This variety is based on *Proudlock 36* from Mergui Island, Burma, deposited in the Calcutta herbarium. Munir (1966) cites only the type collection and notes that the variety "can be easily distinguished from the type form by its involucre bracts being elliptic, acute at apex, and [the] peduncles [being] longer and thicker". Thus far the variety is known only from the original collection.

CONGEA HANSENI Mold., Résumé Suppl. 12: 7, nom. nud. [as "*hanseni*"]. 1965; Dansk Bot. Arkiv 23: [306]. 1966.

Synonymy: *Congea hanseni* Mold., Résumé Suppl. 12: 7, nom. nud. 1965.

Bibliography: Mold., Résumé Suppl. 12: 7. 1965; Mold., Dansk Bot. Arkiv 23: [306]. 1966; Mold., Résumé Suppl. 15: 19. 1967; Hocking, Excerpt. Bot. A.12: 338. 1968; Mold., Fifth Summ. 1: 295 & 468 (1971) and 2: 843. 1971; Heslop-Harrison, Ind. Kew. Suppl. 15: 35. 1974.

This species is based on *Hansen, Seidenfaden, & Smitinand 11182* from Tung Salaëng Luang, Phitsanulok, Thailand, at 550 m. altitude, collected on February 15, 1964, and deposited in the Copenhagen herbarium. It is said to be closely related to *C. oblonga* Pierre [now known as *C. tomentosa* var. *nivea* Munir], differing in its smaller and often binary involucre bracts.

Citations: THAILAND: *Hansen, Seidenfaden, & Smitinand 11182* (Cp--type, Z--isotype).

CONGEA xMUNIRI Mold., Phytologia 15: 269. 1967.

Synonymy: *Congea "connata* Fletcher (x? *C. chinensis* Mold.)" ex Munir, Gard. Bull. Singapore 21: 294. 1966. *Congea munirii* Mold. apud Heslop-Harrison, Ind. Kew. Suppl. 15: 35. 1974.

Bibliography: Munir, Gard. Bull. Singapore 21: 294. 1966; Anon., Biol. Abstr. 48 (23): B.A.S.I.C. S.41 & S.140. 1967; Mold., Biol.

Abstr. 48: 10560. 1967; Mold., Résumé Suppl. 15: 19. 1967; Hocking, Excerpt. Bot. A.13: 570. 1968; Mold., Fifth Summ. 1: 300 & 468 (1971) and 2: 843. 1971; Heslop-Harrison, Ind. Kew. Suppl. 15: 35. 1974; Mold., Phytologia 31: 396 (1970) and 45: 56. 1980.

This supposed natural hybrid between *C. chinensis* Mold. and *C. connata* Fletcher is based on *Alleizette* s.n. from Phan Rang, Annam (Vietnam), Indochina, deposited in the Leiden herbarium. Munir (1966) says that it has "3--4 distinct bracts which are white above as in *C. connata*". Thus far it is known only from the type collection.

CONGEA PEDICELLATA Munir, Gard. Bull. Singapore 21: 300--302, fig. 8. 1966.

Synonymy: *Congea* "*tomentosa* Roxb. sec. Dop" ex Munir, Gard. Bull. Singapore 21: 300, in syn. 1966 [not *C. tomentosa* Roxb., 1819, nor Hall. f., 1947, nor King & Gamble, 1959, nor "Roxb. sec. Wight", 1960, nor "Roxb. sensu King & Gamble", 1966]. *Congea* "*vestita* Griff. sec. Dop" [in part] ex Munir, Gard. Bull. Singapore 21: 300, in syn. 1966 [not *C. vestita* Griff., 1854]. *Congea* "*peteloti* Mold...p.p., non typica" ex Munir, Gard. Bull. Singapore 21: 300, in syn. 1966 [not *C. peteloti* Mold., 1951].

Bibliography: Munir, Gard. Bull. Singapore 21: 267, 271, 275, 276, 279, 300--302, 305, 313, & 314, fig. 8, map 4 (1966) and 22: 158. 1967; Mold., Résumé Suppl. 15: 10, 19, & 20. 1967; Munir, Biol. Abstr. 48: 5018. 1967; Mold., Fifth Summ. 1: 295, 300, 468, & 469 (1971) and 2: 843. 1971; Heslop-Harrison, Ind. Kew. Suppl. 15: 35. 1974; Mold., Phytologia 45: 57. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: 301, fig. 8. 1966.

The species is based on *Pierre* s.n. from Dong Nai, Cochinchina, Indochina, deposited in the Berlin herbarium. Munir (1966) notes that "From *C. vestita* this species differs in its fine, very short, whitish indumentum on the branchlets, inflorescence axes, peduncles and calyces; the leaves are chartaceous cinereo-pubescent; involucre bracts much narrowed to the base, and the flower pedicels longer". He cites *Alleizette* 5723, three *Pierre* s.n. collections, *Smitinand* & *Abbe* 6371, and *Thorel* 648 from Cochinchina, *Harmand* 139, *Poillane* 13683, *Talbot* 103, and *Thorel* 2639 from Laos, *Alleizette* s.n. from Tonkin, and *Poillane* 11674 from Vietnam. He suggests that *C. vestita* var. *subvestita* Munir may represent a hybrid between *C. pedicellata* and *C. vestita* W. Griff.

The *C. tomentosa* credited to Hallier and to King & Gamble in the synonymy above is a synonym of *C. velutina* Wight, while that accredited to Roxburgh "sensu King & Gamble" is *C. griffithiana* Munir and that ascribed to Roxburgh "sec. Wight" is *C. vestita* W. Griff. True *C. peteloti* Mold. is regarded by Munir as a synonym of *C. tomentosa* var. *nivea* Munir.

Recent collectors have referred to *C. pedicellata* as a woody climber common in mixed deciduous woods of Cochinchina, found by them at 600 m. altitude, the "flowers whitish" in January.

Material has been widely misidentified and distributed in herbaria as *C. peteloti* Mold. and as *C. vestita* W. Griff.

Citations: INDOCHINA: Cochinchina: *Pierre s.n.* (W--2515740); Smitinand & Abbe 6371 [Herb. Roy. Forest Dept. 24833] (Z).

CONGEA ROCKII Mold., Phytologia 8: 14--15. 1961.

Synonymy: *Congea rockii* Mold. apud Munir, Gard. Bull. Singapore 21: 283. 1966.

Bibliography: Mold., Phytologia 8: 14--15. 1961; Hocking, Excerpt. Bot. A.5: 45. 1962; Mold., Biol. Abstr. 37: 1062. 1962; Mold., Resume Suppl. 3: 20 (1962) and 14: 8. 1966; Munir, Gard. Bull. Singapore 21: 267, 273--275, 278, 283--284, fig. 2, & map 6 (1966) and 22: 157 & 158. 1967; G. Taylor, Ind. Kew. Suppl. 14: 36. 1970; Mold., Fifth Summ. 1: 295 & 468 (1971) and 2: 843. 1971. Illustrations: Munir, Gard. Bull. Singapore 21: 284, fig. 2. 1966.

Munir (1966) notes that, although the original description of this species speaks of 3-flowered sessile cymes and 3 involucre bracts, "the heads (cymes) are actually [short-] pedunculate, bearing 5--6 flowers, and their involucre bracts are always 4. However, the inflorescence is young and the peduncle and other parts are not fully developed, and the two opposite cymes become so congested in the axils of the foliar bracts that the examination of the cyme is not easy. The long hairs also interfere with the counting of flowers. Hence, unless a cyme is detached it is difficult to make a proper analysis".

The collector refers to this plant as a vine with white "flowers" and found it in anthesis in January. It is known thus far only from the type collection which was originally misidentified and distributed in herbaria as *C. tomentosa* Roxb.

Citations: THAILAND: *Rock 1677* (Ca--264568--type, W--1214567--isotype, Z--isotype).

CONGEA SIAMENSIS Fletcher, Kew Bull. Misc. Inf. 1938: 209 & 440. 1938.

Bibliography: Fletcher, Kew Bull. Misc. Inf. 1938: 209 & 440. 1938; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 60 & 92. 1942; Hill & Salisb., Ind. Kew. Suppl. 10: 58. 1947; Mold., Phytologia 2: 312. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 137 & 173. 1949; Anon., Kew Bull. Gen. Index 82. 1959; Mold., Résumé 177 & 439. 1959; Mold., Résumé Suppl. 3: 17 & 20. 1962; Mold., Dansk Bot. Arkiv 23 : [85]--86, fig. 1. 1963; Munir, Gard. Bull. Singapore 21: 267, 272, 275, 276, 279, 298--299, & 313, fig. 7, map 5 (1966) and 22: 158. 1967; Mold., Fifth Summ. 1: 282 & 295 (1971) and 2: 843. 1971; Mold., Phytologia 45: 56. 1980.

Illustrations: Mold., Dansk Bot. Arkiv 23: 86, fig. 1. 1963; Munir, Gard. Bull. Singapore 21: 299, fig. 7. 1966.

Munir (1966) notes that "This species is often confused with *C. tomentosa* because of the resemblance in the number and colour of their involucre bracts; but the inflorescence axis of *C. siamensis* is less tomentose, involucre bracts and the calyx teeth shorter and has a conspicuous involucre cup. *C. connata* is very close to this in having an involucre cup, but the cup itself is much longer (16 mm.) and the involucre bracts are always 3 and whitish".

[to be continued]

BRYOCRUMIA, A NEW GENUS OF HYPNACEAE (MUSCI)

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In 1950, I found a few strands of a tiny but attractive moss intermingled with other mosses on wet vertical rocks under hemlocks [Tsuga canadensis (L.) Carr.] in a cool, shaded ravine in Whitewater Gorge, about 3 miles above the small village of Jocassee, Oconee County, South Carolina. Although distinctive and in good condition, the identity of the moss eluded me. In despair I sent it to the late Edwin B. Bartram for his opinion. He responded at once and suggested that it was an undescribed species of Glossadelphus Fleisch., urging me to describe it. Glossadelphus is a wide-ranging sub-tropical genus, most of its species ranging in Southeast Asia, Micronesia and Australasia. At that time three species were known from tropical North America, none remotely resembling the South Carolina plants, however. Inexperience and unfamiliarity with the group counseled me against describing it, so Bartram (1951) named it Glossadelphus andersonii.

Since the original collection it has been found along the Whitewater, Toxaway, and Horsepasture gorges in Jackson and Transylvania Counties, North Carolina, and Oconee and Pickens Counties, South Carolina, always sparsely intermingled with other mosses. It appears to be restricted to a high rainfall area (often exceeding 100 inches) of the Blue Ridge Escarpment, along the North and South Carolina boundary, where stream capture has forced the Blue Ridge Divide inland from the Scarp forming a semi-circular area which drains into the Atlantic Ocean. Billings and Anderson (1966) termed this area the South-eastern Blue Ridge Embayment. The area supports a large number of bryophytes of unusual phytogeographic significance. The type locality for Glossadelphus andersonii has since been destroyed by an impoundment, Lake Jocassee, which serves a nearby nuclear power plant. The moss can still be found, however, along the upper reaches of the embayment streams, principally in North Carolina.

In 1965, Howard Crum, in a paper reevaluating the systematic position of G. andersonii, transferred it to Taxiphyllum. Although I agreed that it did not rightfully belong in Glossadelphus, I felt strongly that it should not be placed in Taxiphyllum. We have carried on friendly but rather barbed arguments over the taxonomic position of this curious moss ever since.

Crum (1965) stated: "Contrary to the original description, the leaves are bluntly obtuse or sometimes rounded-obtuse but not rounded at the apex, and the leaf cells are not papillose at the apical angles, although occasionally, and with difficulty, one can find small thickenings at the cell ends which project slightly at back." This is correct except for the leaf apices, which, contrary to Crum, are indeed rounded at the apex in many leaves. Crum might have added that it also has foliose pseudoparaphyllia, which are characteristic of Taxiphyllum. He thought he saw a relationship to Taxiphyllum scalpellifolium (C. Muell.) Bartr., which ranges in Central America.

I have since confirmed the absence of papillae on the leaf cells by examining material under the SEM. The thickenings Crum referred to at the cell ends do indeed give the illusion of papillae, appearing under the light microscope as pellucid dots. Under the SEM, however, there is not the slightest suggestion of papillae. Contrary to Bartram's original description, therefore, the leaf cells are smooth, which eliminates Glossadelphus as an acceptable genus for the moss. This is especially true now, for Robinson (1974) has lecto-typified Glossadelphus by designating a species (Hypnum truncatulum C. Muell.) which has exceptionally prominent papillae on the backs of the leaves. Robinson removed from Glossadelphus the species with smooth leaves so that the genus now embraces only the species which Fleischer (1915-1922) grouped into section Colophyllum, specifically those with rounded to somewhat emarginate leaf apices and apical cells with more or less papillose projections of the cell walls. Since Bartram thought the South Carolina plants were papillose, it is easy to see why he saw a relationship with Glossadelphus. Robinson (l.c.) did not come to grips with Glossadelphus (Taxiphyllum) andersonii, content, apparently, to leave it where Crum (l.c.) had placed it, namely in Taxiphyllum.

Ireland (1969), however, in his elegant treatment of the Plagiotheciaceae, excluded the species from Taxiphyllum, a position he still maintains (in. litt.). Both Ireland (1969) and Iwatsuki (1970) segregate Taxiphyllum principally on the basis of the presence of foliose pseudoparaphyllia, in contrast to Isopterygium, in which the pseudoparaphyllia, if present, are filamentous. Robinson (1974) noted that although the broad pseudoparaphyllia of Taxiphyllum are distinct from those of Isopterygium, they are not always present and are not much different from those of many other pleurocarpous mosses. He defined Taxiphyllum as "...flattened with usually spreading lateral leaves and a vestigial double costa. In addition, most of the species have somewhat shortened apical cells and the leaf cells project on the upper ends abaxially. The alar cells provide a significant lack of differentiation." I would add

to this description the presence of pseudoparaphyllia, following Ireland and Iwatsuki.

Although *Glossadelphus andersonii* possesses foliose pseudoparaphyllia, they differ strikingly from those of plants embracing my concept of *Taxiphyllum*. Pseudoparaphyllia in the latter are much longer than wide and are mostly lanceolate, occasionally obtuse or somewhat rounded-obtuse. In *G. andersonii* they are about as broad as long, and broadly rounded at the apex. The leaves of *G. andersonii* are also slightly decurrent and the alar cells are slightly differentiated with several rows of rectangular cells. These features, coupled with the absence of papillae and the subtle differences in leaf areolation exclude *Taxiphyllum*. All of the genera in this relationship lack clear definition and we may be dealing with over-classification. Nevertheless, as matters stand now, the southeastern escarpment plants under discussion can not be comfortably assigned to *Isopterygium* or *Taxiphyllum*. It seems appropriate, therefore, to place them in a new genus, a disposition which also provides an amicable solution to a long-standing argument.

I am extremely pleased to associate this genus with the name of my long-time close friend and colleague, Howard Crum. It is a friendship that has, thanks to a pleasant atmosphere of good humor and fun, withstood the vicissitudes and trials of many years of close collaboration and association.

Bryocrumia gen. nov.

Sat gracilis, caespitosa, caespitibus depressis, viridis, vix nitida. Caulis repens, irregulariter ramosus, lax et complanate foliosus. Folia patentia, e basi contracta oblongo-ovata, obtusa vel late rotundata, margine plana, superne valde crenulata, inferne minutissime crenulata; cellulae superiores lineari-rhomboideae, chlorophyllosae, laeve, non papillosae, cellulis alaribus haud distinctis. Caetera ignota.

Plants small, bright to yellow-green, in thin, intricate, moderately shiny mats. Stems short, creeping, freely but irregularly branched; pseudoparaphyllia foliose, about as broad as long, broadly rounded at apex; branches horizontal, sometimes slightly tapered at the tips. Leaves not crowded, somewhat remote, erect to wide-spreading and moderately complanate, more widely-spreading when wet, elliptic or oblong-ovate, from a rather strongly contracted base, slightly decurrent, bluntly obtuse to broadly rounded at the apex, ecostate; margins plane, bluntly to sharply serrate in the

upper half, entire or sinuolate below; upper median cells oblong-rhomboidal, flexuose, about 10-25 μ m long and 5 μ m wide, greenish and somewhat obscure, smooth; apical cells shorter than the median cells; basal cells oblong, becoming shorter at the margins and forming an indistinct alar region of rectangular cells. Inflorescences and sporophytes unknown.

Bryocrumia andersonii (Bartr.) comb. nov.

Glossadelphus andersonii Bartr., Bryologist 54: 81, 1951.

Taxiphyllum andersonii (Bartr.) Crum, Bryologist 68: 220, 1965.

Specimens examined: SOUTH CAROLINA: Oconee County, moist vertical rock, cool ravine, hemlock-hardwood community, Lower Falls, Whitewater River, about 3 miles northwest of Jocassee, alt. 1500 ft., June 6, 1950, Lewis E. Anderson, 9237 (holotype, FH; isotype, DUKE); Pickens County, moist vertical rocks, narrow, wooded ravine, Eastatoe River, near Rocky Bottom, August 25, 1976, Lewis E. Anderson, 22,264a (DUKE). NORTH CAROLINA: Jackson County, wet rocks, intermixed with other mosses, shaded hemlock-hardwood cove, Upper Falls, Whitewater River, near Bohaynee, August 25, 1949, Lewis E. Anderson, 8652a; Transylvania County, moist rocks, edge of stream, escarpment gorge, Toxaway Creek, 8 miles southwest of Rosman, July 29, 1952, Lewis E. Anderson, 11,088a; wet rock faces, vertical narrows, East Fork, Thompson River, 5 miles southeast of Bohaynee, July 30, 1952, Lewis E. Anderson, 11,106a.

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MISCELLANEOUS NOTES ON THE HAWAIIAN FLORA I.

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Casual observations made during the course of field work, and peripheral data discovered while researching herbaria or the literature on more specific topics frequently remains in the minds or notebooks of the researchers, unavailable to other workers in the field. This is an unfortunate situation as much of this information is of great value or interest.

The purpose of this, the first of a series of papers, is to record such information on the Hawaiian flora. Short notes on the morphology, taxonomy, biology, distribution and ecology of native and exotic plants in the Hawaiian flora will be presented.

The present paper contains comments on Dubautia, Dissochondrus, Panicum, Bonamia, Liparis and Korthalsella and on additions to the flora of the Leeward Hawaiian Islands.

DUBAUTIA

Three new varieties of Railliardia mistakenly were published twice by E. E. Sherff in 1933. In a later revision of the genus, Sherff (1935) cited the November, 1933 issue of the American Journal of Botany as the place of publication for these varieties. D. D. Keck (1936) and other botanists have followed this incorrect literature citation. It should be noted that the varieties were validly first published in the Botanical Gazette, vol. 95, p. 79, September 1933. The taxa are: Dubautia montana var. longifolia (Sherff) Keck, D. Platyphylla var. leptophylla (Sherff) Keck, and D. menziesii var. angustifolia (Sherff) Keck.

Dubautia sherffiana var. paucinervia (Deg. & Sherff) Herbst. Comb. nov. Railliardia sherffiana var. paucinervia Deg. & Sherff (1951). Am. Journ. Bot. 38:73.

I recently distributed herbarium specimens and seeds of this rare plant from a rather large colony growing

south of Puu Kawiwi, Kamaileunu Ridge, Waianae Mts, Oahu. Because of the number of overlapping characteristics between the two closely related genera, I prefer to consider Railliardia a subgenus of Dubautia.

DISSOCHONDRUS

Dissochondrus is the only genus of grasses endemic to the Hawaiian Islands. Its type and only species, D. biflorus (Hbd.) Ktze, ex Hack., is presently considered a rare plant and has been reported in the literature as occurring only on the islands of Oahu, Molokai and Lanai. As it is now known from all the major islands and is fairly common in the Waianae Mts. of Oahu, I believe that a listing of the Bishop Museum specimens is in order.

- KAUAI: Halemanu, 3,600 feet, Neal s.n., 1929; Mahanaloa Valley, on bare soil, on steep, shaded, north facing slope, el. 1,800 ft., Herbst 2905, 2986, 1973.
- OAHU: Mokuleia, slopes of Kaala, Forbes 1803.0, 1912; Makaleha Ridge, Rock 17081, 1918; Degener without locality, 1932; Palawai Ridge, Degener and Takemoto 10671, 1936; S. Ekahanui, Degener, et. al. 10767, 1936; Pahole Gulch, Mokuleia Forest Reserve, on steep, bare slopes in light to medium shade, el. about 1,800 ft., locally abundant, Herbst 3035, 1973; Ekahanui Gulch, below Puu Kaula, on steep, bare, shaded slopes, el. about 2,300 ft., locally common, Herbst & Obata 5259, 1975; two other collections are from different sub-gulches of Pahola Gulch, Herbst, Obata, Haas, Darwin 5362, 5363, 1975; Kamaileunu Ridge, Waianae Mts., on steep, north facing slope, growing in shaded, bare, loose rocky loam soil in mesic, summer-dry forest, Herbst, Obata, Palmer, Funk, Souza 5967, 1977.
- MOLOKAI: Puu Kolekole, Forbes 219.Mo, 1912; near Laianui, Degener 9155, 1928.
- LANAI: There are no specimens from this island in the Bishop Museum, but the type collection, made by W. Hillebrand, was from Lanai. It was destroyed along with the rest of Hillebrand's angiosperm types, when the Botanisches Museum at Berlin-Dahlem was bombed during World War II.

MAUI: Olowalu Valley, Forbes 2473.M, 1920; Manawai-nui Gulch below Puu Anu on steep, shaded, northeast-facing slope, el. 2,900 ft., Herbst 3022, 1973.

HAWAII: Puuwaawaa, Forbes s.n., 1911.

PANICUM

Panicum nubigenum Kunth - an annual, endemic grass found on dry, low-elevation plains and slopes, has been collected on the islands of Oahu, Mokulua, Molokai, Lanai and Hawaii. While botanizing on Kawelikoa Point, Mahalepu, Koloa District, Kauai, on October 7, 1971, I found a single, stunted plant (D.H. 2209, BISH) which fits the description of this species.

A subsequent visit on January 28, 1972, during the rainy season, revealed a large but restricted population growing in soil pockets among the rocks on the flat summit of the point, at an elevation of 680 ft. Specimens have been distributed under Herbst 2350.

BONAMIA

Bonamia menziesii Gray is a rare liana which has been found in low, arid regions on all of the main Hawaiian Islands. Dr. L. E. Bishop and I discovered a single plant of this species growing on one of the ridges leading to Mt. Kahili, Kauai. It is a robust plant, apparently well adapted to its middle-elevation, wet forest environment (Herbst and Bishop 2454, BISH, PTBG).

LIPARIS

Liparis hawaiiensis, according to Horace Mann (1867) who first described the species, grows "in mountain woods on trees." Otto and Isa Degener (1965) state that "the plants inhabit forests at low to medium and rarely higher elevations, growing mostly epiphytically and on moss-covered bases of tree trunks; also occasionally on the ground." William Hillebrand (1888) also notes that our native species of Liparis grows "on trees or mossy ground in the lower and middle forests of all islands." All imply that normally it is an epiphyte in wet forests and this indeed is where it usually is found. In Waihoi Valley, Maui, for example, where the species is abundant, the annual rainfall is approximately 250 inches. There it normally grows in dense shade on the trunks and limbs of trees which are festooned with bryophytes.

Terrestrial habitats are less common, and are characterized by ground that is muddy, shaded, and usually rich in organic matter, or are covered with mosses and liverworts.

The plant, with its short rhizomes and two pseudobulbs, each bearing a short-lived leaf, seems better suited for an ecological niche subjected to periods of drought, than to a rain forest. While not previously reported from this niche, Liparis hawaiiensis has been found growing in such an environment.

A small colony of 10 plants grows in an area about 21 ft. in diameter above the cut bank along the jeep trail, Milolii Ridge, Kauai, at an elevation of about 2,400 ft. In December, 1972, five of the six mature plants were in flower. The orchids are growing in bare soil, exposed or in light shade. The vegetation of the area consists of an open, low, mixed growth of Acacia koa and Metrosideros with scattered Dodonea, Styphelia, Wilkesia, Gahnia, Eragrostis variabilis and Pteridium. The ground is mostly bare, but has a thin scattering of dead leaves, Cladonia, and mosses.

A voucher (Herbst and Tannowa 2882, BISH) was collected February, 1973, when the plant was in fruit.

More Liparis were found in a similar environment in May, 1973, during a field trip on Maui with Robert Hobdy, assistant district forester with the State Division of Forestry. Two plants were seen at an elevation of about 2,900 ft. in an open Dodonea, Styphelia, Eragrostis scrub area on the steep eastern slopes of Manawainui Valley. The plants (Herbst and Hobdy 3020, BISH) are growing on bare soil beneath a Styphelia shrub.

Dr. F. R. Fosberg (personal communication) has collected Liparis hawaiiensis in similar localities on Oahu and Lanai. His Lanai specimen was collected on a windswept ridge south of Haalelepaaka, growing on the ground under a bush at about 2,700 ft. elevation (Fosberg 12,424, US). The Oahu specimen was collected in the Waianae Mts., Mokuleia, on a wooded ridge east of the gulch of Puu Kaupakuhale, growing under bushes at about 2,100 ft. (Fosberg and St. John 3927, BISH).

John Obata (personal communication) also has found Liparis growing in a similar situation on Oahu.

KORTHALSELLA

Four native genera of parasitic flowering plants occur in the Hawaiian Islands. Three, Cassytha, Cuscuta and Santalum appear to parasitize all available plants, both native and exotic, while the fourth, Korthalsella,

appears restricted to endemic, woody species. A survey of the specimens in the Bishop Museum and University of Hawaii herbaria, and of all available literature on the Hawaiian species of the genus, reveals that the 10 native taxa of the genus have been found parasitizing 29 genera in 20 families of native plants (Table 1). Most commonly it is found on species of Diospyros, Elaeocarpus, Antidesma, Acacia, Eugenia, Metrosideros, Myrsine, Osmanthus, Bohea, Psychotria, Pelea and Sapindus. Ebenaceae, Leguminosae, Myrtaceae, Oleaceae and Rubiaceae are the most frequently parasitized families. During a field trip to Auahi, Maui, two plants of K. complanata were found as parasites on Solanum sodomium, a common Mediterranean weed (Herbst 1978, BISH, PTBG). To my knowledge, this is the only record of a Hawaiian Korthalsella parasitizing a non native plant.

Korthalsella cylindrica (v. Tiegh.) Engler was considered by Danser, the monographer of the genus, to be endemic to the islands of Oahu, Molokai, Lanai and Maui. The Island of Hawaii can now be added to this list (Webster and Wilbur 1870, Puuwaawaa, north Kona at 2,000 ft., 1948, BISH; Fosberg 41,735, Kaupulehu Forest Reserve, north Kona, where it is common, 1973, BISH; Lamoureux, 1955, HAW; Herbst 1592, Kiholo, Kona on Diospyros, 1970, HAW).

In Korthalsella, a single, flat, oval seed is borne in an elastic fruit. As the fruit matures, internal water pressure increases until, when ripe, the fruit bursts and ejects the seed several feet. A mucilagenous coating enables the seed to stick to any surface it strikes. As the seed germinates, a short radicle develops which penetrates the host plant. It is not uncommon for an ejected seed to stick to the parent plant; I have observed this many times on K. complanata and K. latissima. In many instances the germinating seeds begin to penetrate the parent plant but I have not observed development beyond initial penetration. In contrast to Cassytha and Cuscuta, which frequently sink haustoria into their own stems, Korthalsella appears to inhibit parasitizing by its own kind. The "chemical messenger" involved in this phenomenon would make a very interesting study.

ADDITIONS TO THE FLORA OF THE LEEWARD ISLANDS

Through the courtesy of the Division of Wildlife Refuges, U.S. Fish and Wildlife Service and of the United States Coast Guard, I was able to visit Nihoa, Necker, Tern and Laysan Islands of the Leeward Hawaiian Islands.

An annotated list of plants recently collected from

these islands follows. It includes collections of C. R. Long (Sept., 1964), D. Herbst (Aug. & Sept., 1968 and Sept., 1978) and D. Yen (May 1969).

Nihoa:

A total of nearly three full days were spent on the island (August 24-27, 1968). The following species have appeared in a recent publication (Herbst, 1977b), but are included in this list as additional information is provided.

Cenchrus echinatus var. hillebrandianus (Hitchc.) F.B.H. Brown

Two plants were found growing in a pocket of soil on the floor of Miller Valley at an elevation of about 150 ft. Both were removed and the area searched for seeds, apparently unsuccessful as the taxon was collected by Douglas Yen in 1969.

A joint military operation - HIRAN, Phase II aimed at determining the correct location of each of the Leeward Islands - used the Albatross Plateau above Miller Valley as a helicopter landing pad and as a temporary camp in 1961. Kramer and Swedberg (1961) reported that they had found and burned a towel abandoned by one of the HIRAN team members to which six Cenchrus spikelets were attached. As Miller Valley leads to the easiest point of access to the ocean, it is probable that the seeds were carried down on the towel or other clothing of the HIRAN personnel. Herbst 1206 (BISH, US, HAW); Yen 1010 (BISH).

Setaria verticillata (L.) Beauv.

Near south coast, Yen 1012 (BISH).

Portulaca oleracea L.

I found this species in two places in 1968. The largest population was on Albatross Plateau, where the seeds probably were introduced along with the men and supplies during the HIRAN operation. A small colony of young plants, probably established within the year previous to my visit, is located at the base of Miller Valley on a small rise used as campsite by Fish and Wildlife personnel. Long 2431 (HAW); Herbst 1204, 1205

(BISH, US, HAW); Yen 1001 (BISH).

Ipomoea pes-caprae subsp. brasiliensis (L.) v. Oostrstr.

Stony south face, adjacent to east slope of West Palm Valley mouth; el. 100 ft. Yen 1007 (BISH).

Necker:

All five species of plants known to grow on this island were seen, but no others found. Herbst (1977a) recently published on the flora and vegetation of Necker Island. The survey was made on the 28 and 29th of August, 1968.

Tern Island, French Frigate Shoals:

Twelve species of previously unreported plants were collected on Tern Island August 30 to September 1, 1968; and an additional six during my second collection trip on September 11, 1978. Of these eighteen species, three, Hibiscus, Terminalia and Conocarpus, were cultivated plants brought in by Coast Guard personnel to landscape the LORAN station. Three others, Chloris, Salicornia and Frankenia, are new to the Hawaiian flora, but are found in the continental United States and probably were brought in accidentally along with the drums of aviation fuel stockpiled on the northcentral shore of the island, as most were growing around or near the gasoline barrels. The remaining twelve species occur in the Hawaiian Islands and probably were brought in unintentionally with LORAN personnel and supplies.

Following is a list of new additions to the Tern Island flora since Lamoureux's (1961) publication. Several of these species have appeared in subsequent publications (Amerson, 1971 and Fosberg and Sachet, 1975), but are included here so that a record of the disposition of herbarium material is made available.

Chloris petraea Sw.

In 1968, this grass was common in the central and eastern part of the south side of the island; it has now increased greatly in number and covers much more of the island. According to Hitchcock (1951) it is native to "strands, sandy fields, and open pine woods, Coastal

Plain, North Carolina to Florida and Texas; tropical America." In Hawaii, it is known only from Tern Island. Herbst 1221, 6244 (BISH, US, HAW).

Digitaria adscendens (HBK.) Henr.

My notes indicate that in 1968, the plant was common on Tern Island, especially along the edges of the runway. In 1978, it was almost entirely replaced in this area by Sporobolus pyramidatus, and was restricted primarily to several large patches by the boat house of the southwestern part of the island. Herbst 1211, 6225 (BISH, US, HAW).

Eragrostia whitneyi Fosb.

Common along the northeast end of the island. Long 2504 (US, HAW), Herbst 1219 (BISH, US, HAW).

Lepturus repens var. subulatus Fosb.

L. repens has been collected on six of the French Frigate Shoals islands, including Tern Island, where it was quite common in 1978. This taxon, known only from a few small patches on the southcentral part of Tern Island has been tentatively identified by Dr. F. R. Fosberg as L. repens var. subulatus. This variety previously had been known principally from the Central Pacific and Micronesia, but had been collected from Midway and Laysan in the Leeward Hawaiian Islands. Herbst 6236 (BISH, US, HAW).

Fimbristylis cymosa R. Br.

This species was occasional throughout the island, but most common at the eastern end in 1968. It was much more common in 1978. Long 2504 (US, HAW); Herbst 1219, 6245 (BISH, US, HAW).

Chenopodium murale L.

Several large, vigorous plants were found growing along the northeastern part of the island in 1978. Herbst 6222 (BISH, US, HAW).

Salicornia virginica L.

Rare; in 1968, a small colony was growing on bare coralline gravel above the water line by the gas dump, north central side of the island. It probably was washed out during the storm of 1969 as this part of the island was badly damaged by wave action. For a discussion of this collection, see Fosberg and Sachet (1975), page 17. Herbst 1213 (BISH, US, HAW).

Euphorbia glomerifera (Millsp.) L.C. Wheeler

Common on the eastern and central parts of the south side of the island in 1968; not seen in 1978. This species was incorrectly identified as E. thymifolia L. by C. R. Long, and was listed under that name by Amerson (1971). Long 2498 (US, HAW); Herbst 1212 (BISH, US, HAW).

Euphorbia hirta L.

Common on southeastern part of the island in 1968; not seen in 1978. Herbst 1215 (BISH, US, HAW).

Euphorbia prostrata L.

Seen, but not collected by Herbst around the LORAN station, south central part of the island in 1968; not seen in 1978. Long 2505 (US, HAW).

Hibiscus tiliaceus L.

According to Amerson (1971), Judd planted slips of this plant when the Tanager Expedition visited the island June 26, 1923. If they survived, they would have been destroyed in 1942, when the U.S. Navy covered the original Tern Island with coral dredged from the lagoon to create a larger island. In 1968, several small plants of this species were growing near the LORAN station. As the plants were small, and as they were not reported by Lamoureux (1961) or in Long's collection (1964), they probably were brought in by the Coast Guard to landscape the LORAN station shortly before my 1968 trip. The species was not seen in 1978. Herbst 1218 (BISH, US).

Frankenia grandifolia C. & S.

A few plants were found growing around the barrels of aviation fuel at the gas dump, north central side of the islands. This part of the island was badly damaged during the 1969 storm. The top layers of crushed coral from this area were washed away. Later, part of the debris which had washed onto the runway during the storm was pushed into the gas dump area when the runway was cleared. The plant was not seen in 1978. See Fosberg and Sachet (1975), page 20. Herbst 1217 (BISH, US, HAW), det. by Dr. F. R. Fosberg.

Conocarpus erectus L.

A single, small shrub was planted on the south side of the living quarters of the old LORAN station. It was not seen in 1978. Herbst 1216 (BISH).

Terminalia catappa L.

Several young trees were planted around the old LORAN station. A specimen was collected in 1968, but the trees were gone in 1978. As both Conocarpus and Terminalia are tolerant to salt, these two species probably were destroyed during the construction of the new LORAN facilities rather than during the inundation of the island during the 1969 storm. Herbst 1214 (BISH, US).

Heliotropium curassavicum L.

A common indigenous species which very successfully colonizes newly disturbed coastal areas on the main islands. It was first collected on Tern Island in 1978, and is sparingly distributed throughout the island. Herbst 6223, 6248 (BISH, US, HAW).

Heliotropium procumbens var. depressum (Cham.) Fosb.

This plant is indigenous to Guam and other Pacific basin areas, and is a recent introduction to the Hawaiian Islands. It has recently been collected at Barbers Point; Sand Island; Manoa Campus, U. H.; and Mariners Ridge, Hawaii Kai on Oahu. Herbst 6229 (BISH, US, HAW) is the first non-Oahu collection in Hawaii. As the Coast Guard maintains facilities at

both Sand Island and Barbers Point, it can be assumed that the species is on Tern Island as a result of Coast Guard activities. On Tern Island, the plant is presently found primarily on the south side of the island, where it is becoming rather common.

Plantago lanceolata L.

A single, large plant was seen growing along the south side of the tennis courts. Herbst 6230 (BISH, US).

Fifteen months after my 1968 visit, high seas, caused by a massive storm area in the northern Pacific, swamped Tern Island, covering it with as much as two feet of water from dawn until noon. Three to four foot waves washed across the island, toppling trees and covering it with coral and debris (The Honolulu Advertiser, 1969 and Honolulu Star Bulletin, 1969).

By comparing the species lists from my two visits, after deleting the plants obviously recently introduced for landscaping purposes, the species left probably are those able to withstand short periods of inundation by salt water. However, as my second trip was more than eight years after the storm, and as I was able to spend only three hours on the island during that visit, several factors must be considered when judging the validity of such a list: 1) Some species may have been reintroduced after the storm; most of the plants on the list are common and widely spread throughout the state, and most are easily distributed. No botanical documentation was made during the time between the storm and 1978. 2) Some species adapted to a marine coastal environment, as Salicornia, are no longer on Tern Island. Salicornia and Frankenia both occurred in low numbers and were restricted to one small part of the island; a part of the island badly damaged by wave action. It is possible that they were washed off the island during the storm, with no plants or seeds remaining to reestablish the species. 3) Some species may have disappeared due to non-storm related factors. For example, the Salicornia on Tern Island apparently didn't produce seed; the parent plants may have died of natural causes, leaving no progeny behind. Or more aggressive later introductions may have crowded out less competitive species. 4) Factors indirectly related to the storm must be considered also. The changes in the vegetation as a result of the inundation could bring about changes in

competitive factors leading to the loss of some species.
5) Finally, because of my short stay on the island, some uncommon species may have been missed.

The species which apparently were able to withstand approximately six hours of inundation by salt water, and the wave action are:

Cenchrus echinatus
Chloris petraea
Cynodon dactylon
Eleusine indica
Digitaria adscendens
Eragrostis whitneyi
Lepturus repens
Fimbristylis cymosa
Casuarina equisetifolia
Chenopodium oahuensis
Cocoloba uvifera

Boerhavia repens
Portulaca lutea
Portulaca oleracea
Spergularia marina
Tribulus cistoides
Ipomoea pes-caprae
Tournefortia argentea
Scaevola taccada
Conyza bonariensis
Pluchea odorata
Sonchus oleraceus

Laysan:

Eleven days were spent on the island; from the 3rd to the 14th of September, 1968. Two plants new to the island were recorded:

Cenchrus echinatus L.

According to Ely and Clapp (1973), "This species was probably introduced by military personnel in the 1960's. A single plant found near the campsite on the northwest side of the island was destroyed in March 1969 by BSWF personnel. Two more plants flowering in the same general area in September 1969 were also destroyed."

On September 12, 1968, I found a large clump of the species in the same area. After several herbarium specimens were taken, the remaining portions of the plant were sealed in a plastic bag and taken aboard the ship to be disposed of along with the rest of the garbage accumulated during our stay on the island. I sifted the sand surrounding the plant in an attempt to remove all seeds. Herbst 1223 (BISH, US, HAW).

Chenopodium oahuense (Meyen) Aellen

Ely and Clapp (1973) report a single mature plant near the campsite on the northwestern rim on the island. It

probably grew from seeds collected from plants on French Frigate Shoal which were broadcast in this area in September, 1966. Specimens have been distributed under my number 1226 (BISH, US, HAW). The species appears to be established as seedlings have been reported recently (Ely and Clapp, 1973).

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Table 1: Host plants of Hawaiian Korthalsella.

The following list is based upon a survey of the specimens in the herbaria of the Bishop Museum and the University of Hawaii, and of the available literature on the Hawaiian species of the genus. K. latissima var. crassa (v. Tiegh) Danser is omitted as it is known only from the type collection, and the host of that specimen is unknown. A small number of dubious literature citations also have been omitted. The symbols indicate the islands on which the collections were made. They are: H = Hawaii, K = Kauai, L = Lanai, M = Maui, Mo = Molokai, and O = Oahu.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	K. complanata	K. cylindrica var. cylindrica	K. cylindrica var. teres	K. degeneri	K. latissima var. latissima	K. platycaula	K. remyana var. remyana	K. remyana var. wawrae	K. remyi
Aquifoliaceae									
Ilex	O				O, Mo				
Araliaceae									
Cheirodendron	M				K				
Tetraplasandra	O								
Celastraceae									
Perrottetia	O								
Ebenaceae									
Diospyros	K	O, H					O, M, Mo, L	K	
Elaeocarpaceae									
Elaeocarpus	O					K, O			
Epacridaceae									
Styphelia	M, Mo								
Ericaceae									
Vaccinium	M								
Euphorbiaceae									
Antidesma	K, O, Mo, L				K				
Euphorbia			O						

Table 1 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Gesneriaceae									
Cyrtandra	K				K				
Leguminosae									
Acacia	K,O,H					O			O
Sophora	H								
Lobeliaceae									
Clermontia	M				K				
Myrsinaceae									
Myrsine	M,H				K,O				
Myrtaceae									
Eugenia	O,Mo L,H					O,M, L			O
Metrosideros	O,M,H	K,O,M, Mo,L	O				O,M, L	K	
Oleaceae									
Osmanthus	O,M			O		K			
Pittosporaceae									
Pittosporum					K				
Rubiaceae									
Bobea	K,O L				O	K			
Canthium	O,Mo								
Gouldia	O								
Hedyotis					K				
Psychotria	O,M, Mo,H				K				
Rutaceae									
Pelea	O,M, Mo,H				K				
Platydesma	K								
Sapindaceae									
Sapindus		O		O		O			
Sapotaceae									
Planchonella						K,O	O		
Solanaceae									
Solanum sodomium	M								

NYPHAEA AMPLA (NYPHAEACEAE), A WATERLILY NEW TO FLORIDA

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Nymphaea ampla (Salisb.) DC., a species of waterlily previously unknown for Florida and the southeastern United States is here reported from Lee County, southwestern Florida. This species is wide spread in tropical and subtropical America, ranging from Mexico, south through Central America to central Brazil and throughout the Antilles. It is reported by Conard (1905) to reach its northernmost station in southern Texas (Kinney County: Fort Clark and Spofford). Small (1931) also lists it from Texas. However, Correll and Johnston (1970) do not list it for the Texas flora.

The species has been in the Fort Myers area of Florida as early as 1976 (as evidenced by photographs of "*Nymphaea* sp." on file at the Lee County Hyacinth Control District taken September 14, 1976 by Ernest Del Fosse formerly of that agency). Specimens were first collected May 17, 1979 by the junior author and subsequently identified as *N. ampla* by the senior author. Since then, collections have been made at four additional sites.

Nymphaea ampla belongs to subgenus *Brachyceras* which consists of about 12 species. Of these, *N. capensis*, *N. elegans*, and *N. X daubeniana* (a hybrid derived in part from *N. micrantha*) are also found in Florida outside of cultivation. *Nymphaea elegans* is the only indigenous species of the subgenus in Florida; the other two are escapes from cultivation and naturalized.

Nymphaea ampla resembles *N. capensis*, a cultivated African species locally escaped in Indian River and Seminole counties, in being the only other species in Florida with distinctive sinuate-dentate leaves. However, *N. ampla* differs in having white flowers while *N. capensis* has blue to lavender flowers. *Nymphaea ampla* also resembles *N. odorata*, another day-blooming species with large white flowers, but differs in having emergent flowers and sinuate-dentate leaves. *Nymphaea odorata* has nonemergent flowers and entire leaves.

Although *N. ampla* var. *speciosa* (Mart. & Zucc.) Casp. and var. *pulchella* (DC.) Casp. are cultivated, the typical form of *N. ampla* apparently is not. Our plants appear to belong to the typical wild form and not the ones in cultivation.

Nymphaea ampla is well established in Lee County and has also

been observed in the Everglades National Park (Collier County). It is unknown how long *N. ampla* has been a member of the Florida flora. Because of its rather restricted known distribution, it is possibly a relatively recent adventive likely to have been brought in by migratory waterfowl. Because of its wide distribution in the American tropics and subtropics, its presence in Florida is not totally unexpected. Since it is such a spectacular plant, it is unlikely that it would have gone unnoticed for long. On the other hand, the fact that it has been overlooked by botanists until recently is not totally unlikely as the now well known *N. elegans* was not discovered until 1929 (Small, 1931). Also, *N. blanda* was not discovered until 1940 and its true identity was not known until several years later (Ward, 1977). *Nymphaea jamesoniana* was not discovered in Florida until 1967 (Ward, 1977). This points out the fact that the waterlilies are still poorly known in Florida in spite of the work on Conard (1905), Small (1931, 1933), Ward (1977, 1977a), and others.

Seeds of *N. ampla* collected by the junior author from the Florida populations in 1979 have proven to be viable through simple germination tests. The species is known to be very aggressive in nature and to be highly salt tolerant (J. Beckner, pers. comm.) which suggests that it has the potential to remain or even to become a more frequent element of the southern Florida flora.

NYPHAEAE AMPLA (Salisb.) DC., Syst. 2: 54. 1821; non Kotschy ex Casp., 1866.

Castalia ampla Salisb., Parad. Lond. 1, t. 14. 1806.

Nymphaea lotus Aubl., Pl. Guian. Fr. 1: 533. 1775; non L., 1753.

Nymphaea candolleana Lehm., Ham. Gartenz. 9: 203. 1853.

Nymphaea ampla var. *plumieri* Planch., Ann. Sci. Nat. ser. 3, 19: 44. 1853.

Leaves 15-45 cm in diameter, suborbicular, narrowly peltate, sinuate-dentate, upper surface green, flecked with purple spots, lower surface purple, flecked with purple-black spots, veins prominent. Flowers diurnal, white, emergent, 4-7 cm in diameter; sepals 4, oblong-lanceolate, obtuse to acute, outer surface green, marked with distinct short black lines; petals 12-21, oblong-lanceolate, obtuse; stamens 90-190, outermost longer than innermost, anthers apiculate; carpels 14-23, styles short-conical, gradually narrowed to apiculate tip, stigma extending out in short rays. Seeds subglobose to elliptic, ca. 1 mm long, with longitudinal rows of hairs.

SPECIMENS EXAMINED: FLORIDA: Lee Co.: Roadside drainage canal, ca. 3.5 mi. ESE of Fort Myers, T44S, R25E, S26, NE 1/4, May 17, 1979, Les 3 (*), 4 (*), June 19, 1979, Les & Cassani s.n. (USF); First canal N of FLA 78 on Del Prado, T44S, R24E, S6, SE

* Specimens on deposit at Lee County Hyacinth Control District offices.

1/4, October 5, 1979, *Les 143* (USF); Shallow water of roadside ditch, Neal Road, T44S, R26E, S7, NW 1/4, November 13, 1979, *Les 153* (USF); Standing water of roadside ditch, Alt. 41, 0.3 mi. N of FLA 78, T43S, R24E, S35, S 1/2, November 14, 1979 *Les 157* (USF); Eastwood Country Club, shallow pond in golf course, T44S, R25E, S28, SE 1/4, November 11, 1979, *Les 160* (USF).

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BOOK REVIEWS

Alma L. Moldenke

"BOTANY IN CHINA -- Report of the Botanical Society of America Delegation to the People's Republic May 20 -- June 18, 1978" edited by Anitra Thorhaug, v & 154 pp., 1 b/w photo. U.S.-China Relations Program, Stanford University, Stanford, California 94305. or Missouri Botanical Garden, P. O. Box 299, St. Louis, Missouri 63166. 1979. \$7.50 paperbound prepaid incl. postage.

Ten U. S. botanists officially visited the People's Republic of China from May 20th to June 18th 1978 including departments of botany (or biology) in 7 universities that are now reinstating graduate studies, 12 reopened botanical research institutes and academies that are now accepting graduate students, 8 botanical gardens and others in city parks, temple gardens, etc. that were often afflicted by the same vandalism and debris that we know so well here at home. There are accounts of organizational aspects of Chinese botany, major research foci, the botanical institutions visited in 8 cities and the gracious reception afforded the visitors. Appendices give the daily itineraries, the individuals met, bibliography, etc. This publication will be of general interest to botanists and agriculturists and of special interest to those scientific academicians and researchers with parallel concerns in Asia.

"THE WITCH'S GARDEN" by Harold A. Hansen, Translated from the Danish by Muriel Crofts, xii & 128 pp., 10 b/w pl. & 10 fig. Unity Press, Santa Cruz, California 95060. 1978. \$4.95 paperbound.

I will just echo Richard Evans Schultes in his Foreword (since his opinion holds so much more weight than mine) wherein he states that "Much of a fundamental nature can be learned from critical studies of the social, religious, political, and historical influence of the witches' brews, secret formulas, and diabolical potions so cleverly employed in so many diverse ways in medieval Europe". Hallucinogens, soporifics, ergotics, pain-killers, hypnotics, poisons, etc. are some of the materials that have been aided and abetted psychologically by incantations, etc. The texts on mandrake, henbane, nightshade, thornapple, monkshood and the hemlocks, illustrated from early woodcuts, reveal their uses in witchcraft and the influences of witchcraft on so many people in Europe a while back. Fascinating and informative reading!

"LOW MAINTENANCE PERENNIALS" by Robert S. Hebb, iii & 220 pp., 27 line draw. & 72 b/w photo. Demeter Press Book of Quadrangle/The New York Times Book Company, New York, N. Y. 10022. 1975. \$9.00 clothbound and \$4.95 paperbound.

This is indeed a safe guide to the plants referred to in the title because "representatives of most all the major groups discussed here have been tried at one time or another at the Case Estates of the Arnold Arboretum in the area known as the Low Maintenance Garden.....in a frost pocket where winter temperatures may drop to -20° F. or lower". Retail and wholesale nursery sources are given (not recommended). Perennial herbs and shrubs are listed alphabetically with simple descriptive and/or growth directions and sources. The illustrative material is attractively printed and shows what a grower might expect. The author is a well known horticulturist.

"DICTIONARY OF MICROBIOLOGY" by Paul Singleton & Diana Sainsbury, iii & 481 pp., 50 b/w fig. & 10 tab. Wiley-Interscience Publication of John Wiley & Sons, New York, N. Y. 10017. 1978. \$45.00.

The preface describes correctly the nature and uses of this specialized lexicon as a "compact source of readily available and up-to-date information for undergraduates and postgraduates in microbiology and for those studying - or otherwise engaged in - any of the wide range of subjects and disciplines for which some knowledge of microbiology is necessary. The dictionary deals with terms, concepts, techniques, tests, other topics, and over one thousand microbial taxa; the entries....range from short definitions to descriptions and concise reviews." Appendixes diagram several important biosyntheses of amino acids, fermentations, etc.

"PLANTING DESIGN" by Brian Hackett, x & 174 pp., illus. by 14 color & 92 b/w photo & 48 fig. McGraw-Hill Book Company, New York, N. Y. 10020. 1979. \$16.95.

The author, an emeritus professor of landscape architecture at the University of Newcastle-upon-Tyne, has lectured throughout the world stressing "how different plants can be selected and planted in landscapes as a contribution to an appearance which meets the aesthetic principles of the designer while entering into favourable relationships with the habitat and with the other plants. Planting design cannot be separated from landscape design." The book is good for both the professional and the amateur who likes to ask "why?" It starts with an historical survey of planting design through the ages, considers natural plant re-

lationshps, uses and visual effects, ecology and environmental control, wildlife cover and feeding, and easy management -- all intelligently, effectively and attractively.

"GIBBERELLINS AND PLANT GROWTH" edited by H. N. Krishnamoorthy, xv & 350 pp., b/w illus by 64 fig., 31 tab. & 4 photo. Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10016. 1976. \$16.50.

Herein are 12 papers covering the biochemistry, bioassaying, metabolism, roles in germination and abscission, flower and fruit development, gibberellin antagonists and antigibberellins. Most authors are specialists in the British Commonwealth and the United States. Important scientific English-language journals provide the material for easily organized access to graduate students and research workers. This book should prove of value and help to those without access to the periodicals in larger libraries as in the undeveloped countries.

"ENVIRONMENTAL IMPACT ANALYSIS HANDBOOK" edited by John G. Raw & David C. Wooton, xvii & 625 pp., b/w illus by 156 fig., 222 tab. & 19 maps. McGraw-Hill Book Company, New York, N. Y. 10020. 1980. \$36.50.

This compendium of valuable materials, tools, and techniques is dedicated "to the National Environmental Policy Act whose passage made this handbook necessary.....for population growth, high density urbanization, industrial expansion, resource exploitation, air, water and noise pollution, undesirable land use patterns, damage to life systems, threats to health and other consequences adverse to environmental goals....The contents of this handbook are an outgrowth of course notes used by the [8] authors in training programs and courses presented over the last few years through the University of California at Irvine." After clearly developing the concepts of environmental impact analysis, this important text considers analyses of socio-economic factors, air quality, noise, energy, water quality, vegetation and wildlife impacts as well as a summarization.

"ENVIRONMENT AND PLANT ECOLOGY" by John R. Etherington, xii & 347 pp., b/w illus by 107 fig., 18 tab. & 5 maps. John Wiley & Sons, New York, N. Y. 10016. 1975. \$28.95.

This is still a modern, important study several of whose figures display information and processes in different effective forms which are additionally helpful as teaching and/or studying aids. "This book attempts to examine some of the details of this intricate jigsaw of plant, animal, microorganism and environmental interactions as it manifests itself in plant

physiological ecology. The problem is to dissect the network of energy fluxes, elemental cycles and control systems and to present them in the light of the individual species' behaviour and competitive interaction.....The ultimate in ecosystem modelling is to describe not only general functional relationships but also the population dynamics of the species concerned."

"DESERT JOURNAL - Reflections of a Naturalist" by Raymond B. Cowles in collaboration with Elna S. Bakker, xv & 263 pp., b/w illus by 42 draw., 25 photo. & 1 map. University of California Press, Los Angeles, California & Berkeley, California 94720 & New York, N. Y. 1978. \$10.95 clothbound & \$4.95 paperbound.

What a delightful testimonial to the 50 years of the author's professional life as a naturalist of far more depth than just the descriptive kind and as a professor who took his university classes on wonderful field trips. The first part of the book has 11 essay chapters on Survival in an Arid Environment, describing desert living adjustments of plants and animals, especially the reptilian exotherms in the (irrigation) Ditch Camp and the Mesquite Camp. The second part has 12 more fascinating chapters on Surviving Each Other, describing herbivore and predator roles, microniches, adaptations, debunking myths and an important plea for controlling excessive human population.

"THE BIOLOGY OF SYMBIOTIC FUNGI" by Roderic Cooke, xi & 282 pp., b/w illus. by 75 fig., 25 photo. & 26 tab. John Wiley & Sons, New York, N. Y. 10016. 1977. \$29.95.

This excellent interestingly presented and well organized study treats symbiosis in the original literal broad de Bary concept that includes the following groups and their overlaps -- 1 & 2 Antagonistic-Facultative and Obligate, 3 & 4 Neutral-Facultative and Obligate, and 5 & 6 Mutualistic-Facultative and Obligate Symbionts in and on dead and/or living protists, plants, animals and other fungi. Much of the research studies reported in this broad field are those of microbiologists, entomologists, phytopathologists and medical scientists; this orientation is that of the mycologist.

"IMPORTANT FOREST TREES OF THE UNITED STATES" by Elbert L. Little Jr., i & 70 pp., b/w illus by 204 fig. & 204 distribution maps. Agriculture Handbook No. 519. 1978. \$2.10 paperbound, from U. S. Gov't Print. Off., Washington, D.C. 20402.

This inexpensive compact book has been culled and updated from the author's "Trees", the 1949 Yearbook of Agriculture and his 5 volumes on the "Trees of the United States" which represent a professional lifetime of excellent work. For 204 species there are given common and scientific names, drawings, keys, descriptions, uses and distribution.

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PHYTOLOGIA

A cooperative nonprofit journal designed to expedite botanical publication

Vol. 45

February 1980

No. 2

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NOTES ON THE LYCHNOPHORINE GENERA *CHRESTA* AND *EREMANTHUS*.

(VERNONIEAE: ASTERACEAE)

Harold Robinson
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The Subtribe Lychnophorinae of the Vernonieae has been distinguished by Bentham and Hooker (1873) and Hoffmann (1890-94) by the presence of clustered syncephalous usually few-flowered heads in the inflorescence. The subtribe is partially artificial, but it is notable for containing various elements that are individually very distinct from *Vernonia*. The typical and rather natural element of the subtribe, represented by *Lychnophora*, and *Eremanthus*, and a few other closely related genera, is restricted almost completely to eastern Brasil, and has come under study as a result of efforts to identify various collections from that area. The study has resulted in the discovery of significant characters in the pollen and the nectary, and has shown the need to resurrect the genus *Chresta* from synonymy. One new species of *Eremanthus* and one new species of *Chresta* are described.

The genus *Eremanthus* has been interpreted broadly in most treatments to include those species of the complex in which the inner pappus setae are not contorted and are persistent. The typical element of the genus is distinctly shrubby, but a number of the species are herbaceous and some are scapose from a basal rosette of leaves. A number of generic segregates have been suggested for various of the more herbaceous elements, *Chresta* Vell. ex DC., *Pycnocephalum* (Less.) DC., *Stachyanthus* DC., and most recently *Glaziovianthus* Barroso. It has been necessary to determine the need for segregation of the herbaceous elements of *Eremanthus* and to determine what name or names are applicable.

Typical *Eremanthus*, based on *E. glomerulatus* Less., has short cylindrical basal tubes on the corolla, smooth inner surfaces of the corolla lobes, and *Lychnophora*-Type pollen. The herbaceous species all share some details by which they differ from the shrubby species. Most obviously, the corolla tubes are very elongate and partially funnelform. More detailed examination shows a papillose inner surface at the bases of the corolla lobes, a character that seems unique in the tribe. The papillae differ from those of most other tribes by occurring in a series on each of the elongate cells of the corolla surface, rather than each representing a single cell. One other feature found in most of the herbaceous species is a distinctly lophorate type of pollen grain. These have a pattern with colpar areolae similar to the *Vernonia argyrophylla*-Type, but they have low ridges as in the *Lychnophora*-Type found in typical *Eremanthus*. Only two of

the herbaceous species examined lack the specialized pollen, *E. eriopus* Sch.Bip. ex Baker and *E. curumbensis* (Philips.) H. Robins. On the basis of the combined characters, the more herbaceous series of species is regarded as a separate and natural genus.

Of the four names that have been provided for the various herbaceous species, three have equal priority, dating for purposes of validation from the Prodrum of de Candolle (1836). One of the names, *Stachyanthus* based on *S. martii* DC., was entirely new at that point. It is also the name most readily dismissed, having been rejected in favor of the later *Stachyanthus* Engler, nom. cons. of the Icacinaceae. The two other names have a history preceding their use by de Candolle. *Pycnocephalum* (Less.) DC., based on *Vernonia plantaginifolius* Less. and *V. scapigera* Less., was originally a section under *Vernonia*. *Chresta* Vell. ex DC., based on *C. cordata* Vell., nom. inval. (= *C. spaerocephala* DC.) and *C. lanceolata* Vell., nom. inval., was initially published without description. Vellozo names are usually considered valid on the basis of the plates with details, but a new genus and its included species cannot be considered validated without a genus description. Given names of equal priority, the choice must be made by a later author. I follow here Gardner (1842) who gave precedence to the name *Chresta*.

The most recent generic name provided in the group, *Glaziouvianthus* Barroso (1947), presents special problems. The type was *G. purpureus* Barroso, and reference was made to a previous unvalidated name, *Eremanthus labordei* Glaziou. The most important character of the genus was the deciduous pappus, a feature contrasting with the traditional characters of *Eremanthus*. The species involved closely resembles members of the genus *Chresta*, and might be placed there except for the presence of a *Lychnophora*-Type pollen and the deciduous pappus. Examination shows that the corolla shape and papillosity are as in *Chresta*, and generic distinction is not recommended here. Furthermore, *Eremanthus eriopus* also has *Lychnophora*-Type pollen, but has a persistent pappus, falling between the two groups.

There are two species names that must be considered in relation to *Glaziouvianthus*. *Chresta speciosa* Gardn. was described as having a deciduous pappus, and it is almost certainly a very closely related species, though Gardner's plate (1842) shows much narrower strap-shaped leaves with teeth only near the obtuse tip. *Eremanthus curumbensis* Philipson (1938), according to the description is the same species described by Barroso (1947), and the name should be used in which ever genus the species is placed.

CHRESTA Vell. ex DC., Prodr. 5: 85. 1836. *Chresta* Vell., Fl. Flum. 8: t. 150, 151, nom. inval.

Pycnocephalum (Less.) DC., Prodr. 5: 83. 1836. *Vernonia* sect.

Pycnocephalum Less., Linnaea 6: 630. 1831.

Stachyanthus DC., 5: 84. 1836, nom. rej. in favor of *Stachyanthus* Engl., nom. cons. (Icacinaeae).

Perennial herbs or subshrubs, with inflorescence terminal or from axils of upper leaves, long-pedunculate, often scapose from a rosette of leaves. Heads clustered in synflorescences, discoid, few-flowered; involucre bracts subimbricate, inner often deciduous. Flowers homogamous, 2-12; corollas reddish to purple; basal tube elongate, very narrowly funnelform; throat very short or lacking; lobes 5, linear, with distinct papillae on lower inside surface; anther appendages with or without glands; nectary elongate; style base without node; style branches filiform, hirtellous abaxially; achenes prismatic, ca. 10-costate; pappus with outer series present, of various lengths, usually not sharply differentiated; inner pappus usually persistent (deciduous in *Glaziovianthus*), tapering to tip. Pollen usually lophorate, with colpar areolae reaching to poles, usually with partial walls above and below pores, usually 2 rows of intercolpar areolae, a few species with *Lychnophora*-Type pollen.

Lectotype species: *Chresta sphaerocephala* DC., present designation.

The following 11 species are recognized.

Chresta angustifolia Gardn., Lond. Jour. Bot. 1: 240, t. 8. 1842.
Eremanthus angustifolius (Gardn.) Baker in Mart., Fl. Bras. 6 (2): 170. 1873.

CHRESTA CURUMBENSIS (Philips.) H. Robins., comb. nov. *Eremanthus curumbensis* Philips., Kew Bull. 7: 298. 1938. *Glaziovianthus purpureus* Barroso, Rev. Brasil. Biol. 7 (1): 115. 1947.

CHRESTA ERIOPUS (Sch. Bip. ex Baker) H. Robins., comb. nov.
Eremanthus eriopus Sch. Bip. ex Baker in Mart., Fl. Bras. 6 (2): 169. 1873.

Chresta exsucca DC., Prodr. 5: 85. 1836. *Eremanthus exsuccus* (DC.) Baker in Mart., Fl. Bras. 6(2): 166. 1873.

CHRESTA MARTII (DC.) H. Robins., comb. nov. *Stachyanthus martii* DC., Prodr. 5: 84. 1836. *Eremanthus martii* (DC.) Baker in Mart., 6 (2): 167. 1873.

Chresta plantaginifolia (Less.) Gardn., Lond. Jour. Bot. 1: 241. 1842. *Vernonia plantaginifolia* Less., Linnaea 4: 251. 1829. *Pycnocephalum plantaginifolium* (Less.) DC., Prodr. 5: 83. 1836. *Pycnocephalum spathulaefolium* DC., Prodr. 5: 83. 1836. *Chresta spathulaefolia* (DC.) Gardn., Lond. Jour. Bot. 1: 241. 1842. *Eremanthus plantaginifolius* (Less.) Baker in Mart., Fl. Bras. 6 (2): 168. 1873.

Chresta pycnocephala DC., Prodr. 5: 85. 1836. *Eremanthus pycnocephalus* (DC.) Baker in Mart., Fl. Bras. 6 (2): 166. 1873.

Chresta scapigera (DC.) Gardn., Lond. Jour. Bot. 1: 241. 1842. *Pycnocephalum scapigerum* DC., Prodr. 5: 83. 1836. *Eremanthus scapigerus* (DC.) Baker in Mart., Fl. Bras. 6 (2): 168. 1873.

Chresta speciosa Gardn., Lond. Jour. Bot. 1: 240, t.9. 1842. *Eremanthus speciosus* (Gardn.) Baker in Mart., Fl. Bras. 6 (2): 169. 1873.

Chresta sphaerocephala DC., Prodr. 5: 85. 1836. *Chresta cordata* Vell., Fl. Flum. 8. t. 150, nom. inval. *Chresta intermedia* Gardn., Lond. Jour. Bot. 4: 236. 1845. *Eremanthus sphaerocephalus* (DC.) Baker in Mart., Fl. Bras. 6 (2): 167. 1873.

CHRESTA SOUZAE H. Robins., sp. nov.

Plantae herbaceae perennes rosulatae acaulescentes. Radices subtuberosae. Folia in rosulis spiraliter inserta sessilia; laminae herbaceae obovatae vel oblanceolatae 2-3 cm longae et 0.7-1.0 cm latae base cuneatae margine integrae apice obtusae vel breviter acutae supra glabrae vel glabrescentes glandulo-punctatae subtus plerumque inferne et in nervis villosae vel sublanatae ubique glandulo-punctatae, nervis secundariis paucis utrinque ca. 2 valde ascendentibus. Inflorescentiae scaposae, scapi 4-8 cm longi dense sordide pilosi, pilis appressis vel subappressis T-formibus glomerulis apicalibus solitariis capituliformibus ca. 8-10-capitatis. Capitula sessilia anguste campanulata vel subcylindrica ca. 14 mm alta et 4-5 mm lata; squamae involucri ca. 10 in partibus deciduae breviter oblongae vel anguste ellipticae ca. 5-8 mm longae et 1.8-2.5 mm latae apice breviter acuminatae pungentes margine late scariosae dense minute fimbriatae extus plerumque glabrae superne ad medio fuscescentes ad apicem interdum purpureo-tinctae. Flores ca. 7 in capitulo. Corollae lavandulae 12-13 mm longae, tubis ca. 8 mm longis extus sparse minute glanduliferis, faucibus nullis vel subnullis, lobis anguste oblongis ca. 5 mm longis et 1 mm latis extus superne pauce glandulo-punctatis intus inferne papillois, nervis loborum e marginis remotis; thecae antherarum ca. 2.5 mm longae; appendices antherarum oblongae ca. 0.35 mm longae et 0.25 mm latae margine involutae extus pauce glanduliferae; nectaria elongata ca. 1.5 mm longa glabra; basi stylorum non noduliferi; scapi stylorum in partibus hirtellis superioribus ca. 2.5 mm longi. Achaenia ca. 2 mm longa perdense sericeo-setifera; setae pappi interiores longiores persistentes ca. 15 ad 7.5 mm longae, setae exteriores irregulariter breviores numerosae, setae omnino superne angustiores plerumque ad marginem subbarbellatae. Grana pollinis ca. 60 μ m in diametro distincte lophorata, cristis

humilis minute multo spinuliferis, spinis majoribus nullis (reticulation *Chresta*-Type).

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, 14°S, 47°W, ca. 12 km NW of Veadeiros, wet campo. Elev. 1200 m. Rosette herb from deep root, with fleshy leaves. Heads ca. 10 cm high, magenta. Locally common. *H.S. Irwin, R. Souza, R. Reis dos Santos 9286* (Holotype UB, isotype US).

The new species seems closest to *Chresta plantaginifolia*, but the plants are much smaller with shorter, less lepidote, more prominently glandular-punctate leaves, and the involucre bracts are distinctly sharply acuminate. On the basis of field notes the leaves are also more fleshy, and the venation is not prominent in the dried plants.

The revised concept of *Eremanthus* is as follows:

EREMANTHUS Less., *Linnaea* 4: 317. 1829.

Shrubs or subshrubs, with inflorescences terminal on branches, leaves not in rosettes. Inflorescences corymbose-paniculate. Heads densely corymbose or clustered in synflorescences, discoid, few-flowered; involucre bracts subimbricate, inner often deciduous. Flowers homogamous, 1-11 (typical element 1-flowered); corollas reddish to purple; basal tube usually short-cylindrical, rarely slightly funnelform; throat short or lacking; lobes 5, linear, smooth on inner surface; anther appendages glabrous, with tips flat and somewhat indurated; nectary shorter than wide, usually glabrous (hirsute in 1 species); style without basal node; style branches filiform, hirtellous abaxially; achenes prismatic or slightly obcompressed, ca. 10-costate; pappus with outer series of various lengths, sometimes not sharply differentiated; inner pappus persistent, setae tapering to tip. Pollen of *Lychnophora*-Type.

Type species: *Eremanthus glomerulatus* Less.

As presently recognized the genus excludes all strictly herbaceous and rosette-forming species. The present concept does include all the species approaching *Vernonia* in the presence of looser inflorescences, such as *E. crotonoides* Sch.Bip., *E. elaeagnus* (Mart.) Sch.Bip., *E. leucodendron* Mattf., and *E. veadeiroensis* described below. The generic placement of the last of these is discussed briefly below.

Three collections matching the description of *Eremanthus mattogrossensis* O.Kuntze have been seen, and in all three the nectary is densely hirsute. The character is readily observable since the nectary remains with the achene after the corolla falls. The genus was not completely surveyed, but no other species has been seen with the character. Only one other example of a pubescent nectary is presently reported in the Asteraceae, *Sciadocephala amazonica* K. & R., in the Eupatorieae (King & Robinson, 1974).

The following species is described as new.

EREMANTHUS VEADEIROENSIS H. Robins., sp. nov.

Plantae fruticulosae vel contorte arborescentes 1.5-3.0 m altae multo ramosae. Caules teretes dense brunnescentiter velutini, internodis brevibus plerumque 3-8 mm longis. Folia spiralter inserta, petiolis indistinctis; laminae oblanceolatae plerumque 3-6 cm longae et 0.8-1.1 cm latae base subpulviniformes fere ad basem constrictae superiores sensim latioribus margine integrae apice anguste rotundatae vel breviter obtusae supra et subtus dense breviter griseo-tomentosae, nervis pinnatis, nervis secundariis subobscuris utrinque ca. 6 ascendentibus. Inflorescentiae in ramis terminales dense corymbosae vel subcymosae pauci-capitatae, ramis dense velutinis vel tomentosis, bracteis foliiformibus plerumque 0.9-2.5 cm longis et 3-8 mm latis. Capitula in greggis parvis sessilia vel breviter pedunculata ca. 11-14 mm alta et 6-7 mm lata; squamae involucri ca. 45 subimbriatae 4-5-seriatae appressae ovatae vel elliptico-lanceolatae 2-7 mm longae et ca. 1.5 mm latae apice acutae purpurascentes margine inferne anguste scariosae extus griseo-tomentosae; receptacula cristifera minute denticulata. Flores 8-11 in capitulo. Corollae lavandulae in textura subfirmae 7.0-7.5 mm longae, tubis cylindricis ca. 3.5 mm longis ca. 1 mm latis extus plerumque glabris base et apice in seriebus solitariis glanduliferis, faucibus nullis vel subnullis, lobis anguste lanceolatis ca. 4 mm longis et 0.8 mm latis extus dense glandulo-punctatis subapice uni- vel pauci-setiferis, setis valde contortis interdum parum T-formibus; thecae antherarum ca. 3 mm longae; appendices antherarum oblongo-ovatae ca. 0.8 mm longae et 0.3 mm latae apice anguste rotundatae glabrae; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longi. Achaenia ca. 3.5 mm longa leniter asymmetrica costata sparse antrorse setifera; setae pappi albae vel rubrescentes persistentes interiores 40-45 ca. 7 mm longae subcomplanatae apice vix angustiores margine et extus scabridulae, setae exteriores filiformes vel subsquamaeformes apice attenuatae extus sparse scabridulae. Grana pollinis ca. 50 μ m in diametro inter spinulam irregulariter areolata (*Lychnophora*-Type).

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, ca. 20 km N. of Alto do Paraíso, elev. ca. 1250 m, Outcrops, Cerrado on sandstone outcrops with adjacent wet campo (brejo). Shrub ca. 1.5 m tall. Heads pinkish lilac. *H.S. Irwin, R.M. Harley, G.L. Smith 32752* (Holotype UB, isotype US). PARATYPE: BRASIL: Goiás: Chapada dos Veadeiros, 14°S, 47°W, ca. 20 km W. of Veadeiros. Elev. 1000 m. Rocky slopes and wet campo. Gnarled tree ca. 3 m X 6 cm. Heads dull rose-violet. *H.S. Irwin, J.W. Gear, Jr., R. Souza, R. Reis dos Santos 12561* (US).

The new species was originally put aside as an undescribed *Vernonia* because of the non-syncephalous inflorescence and the general resemblance to *V. eremophila* Mart. Detailed analysis has indicated relationship to the *Lychnophorinae*, however. The gnarled stems with velutinous pubescence are reminiscent of *Lychnophora*, while the pollen is of the *Eremanthus-Lychnophora*-

Type which is comparatively rare in *Vernonia*. The number of flowers in the head is much less than $\frac{1}{2}$ the number of involucral bracts, a feature found in *Vernonia* only in the section *Critoniopsis* which the new species does not resemble. Nevertheless, the heads of the new species do contain more flowers than most other members of the Lychnophorinae. The receptacle bears low denticulate crests of a type unknown in *Vernonia*. Detailed examination of the flowers shows a pappus, an achene shape, rather evenly tapering corolla lobes, and a short-cylindrical corolla tube matching those found in *Eremanthus*. In aspect, the new species most strongly resembles two other species with non-syncephalous inflorescences, *E. elaeagnus* of Minas Gerais which has only 3 flowers per head, and *E. leucodendron* of Bahia which has 5 flowers per head. According to the description, the latter species also differs by having a more funnelform tube on the corolla.

The study has also resulted in the recognition of the following new species which falls within the presently accepted technical limits of the genus *Lychnophora*.

LYCHNOPHORA SANTOSII H. Robins. sp. nov.

Plantae fruticosae ad 1.5 m altae dense ramosae. Caules teretes superne canescentiter dense lepidoti, lepidis stellatis peltatis breviter stipitatis breviter ramosis. Folia spiralter inserta vel raro subopposita subsessilia, petiolis 1-2 mm longis; laminae ellipticae vel leniter obovatae plerumque 1.2-1.5 cm longae et 0.5-0.7 cm latae base acutae margine integrae apice rotundatae vel breviter obtusae supra glauco-virides non pilosae dense appresse glandulo-punctatae subtus perdense compactae albomomentosae, pilis individuus stellatis. Inflorescentiae in ramis terminales syncephalae, bracteis foliiformibus ad 1.2 cm longae in petiolis ad 4 mm longis. Capitula unusquisque in axillis bracteorum disposita subcylindrica ca. 9 mm alta et ca. 2 mm lata; squamae involucri sordido-virides ca. 20 subimbricatae erectae subappressae ovatae vel anguste oblongae 1.5-4.5 mm longae et 0.8-1.0 mm latae apice acutae margine superne anguste scariosae minute fimbriatae in partibus purpureo-tinctae extus dense pallide glandulo-punctatae. Flores 3 in capitulo. Corollae lavandulae? 5.5-6.5 mm longae extus etiam ad basem dense glandulo-punctatae, tubis 2-3 mm longis, faucibus subnullis, lobis oblongo-lanceolatis ca. 3 mm longis et 0.5-0.7 mm latis; thecae antherarum ca. 2.3 mm longae; appendices antherarum anguste ovatae ca. 0.7 mm longae et 2.7 mm latae margine involutae extus glabrae; basi stylorum non noduliferi; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longi. Achaeia ca. 2.8 mm longa inter costas dense breviter setifera, carpodiis minutis; setae pappi purpurascens interiores ca. 25 aliquantum deciduae plerumque 5.0-5.5 mm longae anguste taeniiformes leniter tortuae, squamae exteriores numerosae lanceolatae ca. 1 mm longae. Grana pollinis ca. 45 μ m in diametro

(*Lychnophora*-Type).

TYPE: BRASIL: Bahia: Municipio de Rio de Contas. Pico das Almas, a 18 kms ao NW de Rio de Contas. Elev. 1600-1850 m. Shrub 1½ m tall, flowers all past anthesis. *R.M.King, S.Mori, T.S.Santos & J.Hage 8114* (Holotype RB, isotype US).

The species has a pappus most like that of *Lychnophora blanchetii* Sch.Bip., also from Bahia, but there is no evidence of complete reduction of the outer pappus series as sometimes occurs in the latter species. The new species is unusual in *Lychnophora* by the broad elliptical to obovate leaves lacking recurved margins. The equally broad bracts of the inflorescence are also prominent with their whitish undersurfaces among the reddish heads.

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Chresta souzae H. Robinson, Holotype, Herbário Universidade de Brasília. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Eremanthus veadeiroensis H. Robinson, Holotype, Herbário
 Universidade de Brasília.



ASTERACEAE of BAHIA, BRAZIL

Lychnophora santosii H. Robinson, Holotype, Jardim Botânico,
Rio de Janeiro.



Enlargements of heads. Top. *Chresta souzae*. Middle. *Eremanthus veadeiroensis*. Bottom. *Lychnophora santosii*.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CLXXXVI.

A REVIEW OF THE GENUS *STYLOTRICHUM*.

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As in the case of other genera endemic to Bahia, material of *Stylotrichum* has accumulated slowly during the last hundred and fifty years, and species concepts have not been adequately tested. The first species known was *Agrianthus corymbosus* DC. based on a Blanchet collection. The species was transferred at one point to *Ageratum* (Baker, 1876), but eventually was placed in the new genus, *Stylotrichum*, by Mattfeld (1924) along with a second species that was described as new. Barroso (1957) has recently added a third species. A review of the genus has been occasioned by the need to identify some new collections, and the effort has been aided by the opportunity to examine typical material of all three previously described species.

Stylotrichum is rather distinctive in habit with crowded spreading spirally inserted leaves and abrupt corymbose inflorescences on the ends of the branches. The members of the genus have been spared inclusion in the broad concept of *Eupatorium* that was suffered by closely related genera, because the members all have a reduced pappus. The genus is named after its most unique feature, the dense spreading pubescence that covers most of the shaft of the style. All the species also share a rather distinctive form of pubescence on the stems, peduncles and even the corolla, unlike that in related genera. The majority of the hairs are a smaller variation of what might be generally termed the *Hieraceum*-type, being biseriate with a triangular shape tapering to the tip which often bears a minute gland. The outer walls are somewhat thickened while the walls between the two rows of cells are thin and form a variably zigzag line. The corollas tend to be short compared to their width, and in spite of one indication to the contrary, the flowers of all the species are apparently whitish.

The review of material has shown four species in the genus, the most distinct being previously undescribed. All three previously known species have been maintained, though the differences require clarification. The present concepts indicate some geographical differentiation within Bahia, but this is based on very few collections.

Stylotrichum corymbosum (DC) Mattf. occurs in north-central Bahia around Jacobina. The leaves have been described as sessile, being narrowly obovate and evenly tapering to the base. The glandular punctations are reddish, being particularly noticeable

on the upper part of the corollas and on the upper surfaces of the leaves. The setae of the pappus are mostly 0.6-1.0 mm long, and the carpopodium is not distinctly enlarged. The hairs of the corolla are almost all with small glandular tips. The anther thecae examined are mostly pale while those of the other species are distinctly reddish. Two collections have been seen, *Blanchet 2535* (isotype US) and *Schery 669* (US).

Stylotrichum edmundoi Barroso is known from Morro do Chapéu in north-central Bahia. The leaves are short, about 5 mm long, obovate, and constricted below into a short petiole. The glandular punctations are pale, and none have been seen on the upper surfaces of the leaves. The setae of the pappus are mostly 0.6-1.0 mm long, and the carpopodium is moderately enlarged, having a slight upper rim. The corolla has some scattered hairs of the corolla with narrowly pointed non-glandular tips. The species is the only member of the genus seen in which there are no capitate glands among the hairs on the upper shaft of the styles or on the backs of the stigmatic portion of the style branches. Two specimens have been seen: *Edmundo Pereira 2010* (isotype US); and *Duarte 9204-E. Pereira 10114* (US).

Stylotrichum rotundifolium Mattf. occurs in south-central Bahia near "Bom Jesus" and near Mucugê. The leaves have nearly orbicular blades up to 2 cm broad on very short petioles. The glandular punctations are pale. The setae of the pappus are 0.3-0.5 mm long with the apical cells often very blunt-tipped. The carpopodium is the largest in the genus with a prominent upper rim. The corolla has numerous hairs without glandular tips. The setae on the achene vary in length but seem to differ from the other species of the genus by almost always having one of the two apical cell-tips greatly exceeding the other in length. Three collections have been seen: *Ldltselberg 299* (isotype M); *King et al. 8149* (CEPEC, RB, US) with only smaller upper leaves present; and *Duarte 9361-E. Pereira 10074* (US), a specimen lacking inflorescences from somewhat farther north near Lençóis.

STYLOTRICHUM SUCREI R. M. King and H. Robinson, sp. nov.
Plantae herbaceae? erectae 30-40 cm altae paucae ramosae in caulis paginis superioribus et inferioribus foliorum pedunculis et squamis involucri dense stipitato-glanduliferae. Caules teretes striati. Folia spiraliter inserta, petiolis 2-3 mm longis; laminae late obovatae 10-13 mm longae et 6-10 mm latae base acute cuneatae margine superiore distincte crenulatae apice rotundatae supra et subtus dense stipitato-glanduliferae subtus in nervis et nervulis valde prominulis, nervis secundariis paucae ascendentibus subtrinervatis. Inflorescentiae laxae corymbosae base subumbellatae, ramis ultimis 1-3 cm longis. Capitula ca. 6 mm alta et 7 mm lata; squamae involucri ca. 25 eximbricatae subaequilongae oblanceolatae vel lineares ca. 5 mm longae apice breviter acutae extus bicostatae dense stipitato-glanduliferae et glandulo-punctatae; receptacula distincte conica glabra. Flores

ca. 50 in capitulo; corollae albae? 2.7-3.0 mm longae extus inferne dense stipitato-glanduliferae superne pallide glandulopunctatae, tubis ca. 1 mm longis, faucibus 1.5-1.7 mm longis distincte infundibularibus, lobis late triangularibus ca. 0.4 mm longis et 0.5 mm latis; thecae antherarum distincte lavandulae ca. 0.9 mm longae; appendices antherarum ca. 0.1 mm longae et 0.25 mm latae; rami stylorum inferne extus glanduliferi. Achaenia 2.5-2.7 mm longa plerumque in costis dense paxilliformiter setifera inter costas glandulo-punctata; carpodia valde prominentia annuliformia; pappus nullus. Grana pollinis 23-25 μ m in diam. breviter spinulifera.

TYPE: BRASIL: Bahia: Andaraí, sobre pedros, heliofita.

Dimitri Sucre 10853 (Holotype RB, isotype US).

The new species is strikingly distinct from the other three known members of the genus. The hairs of the stems, leaves and peduncles have glandular tips while the hairs of the other species do not. The upper surfaces of the leaves are densely pubescent while the leaves of the other species have only a few hairs on the main veins. The corollas are longer and more funnel-form, while in the other species the corollas are scarcely narrower below. It is the achene that is most distinct, lacking a pappus, bearing a short and very broad annuliform carpodium, and bearing unique peg-like setae having rounded tips. Still, in all basic characters, including the prominent net-veining of the leaf undersurface and the stout somewhat curved achenes, the species is like other members of the genus.

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JARDIM BOTÂNICO DO RIO DE JANEIRO

Herb. N.º

Esm.

Stylotrichum sucrei R.M.K. & H.R. 4 Dec. 1950

Proced.

Obs.

UNITED STATES

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NATIONAL HERBARIUM

Col.

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Data

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Stylotrichum sucrei R. M. King & H. Robinson, isotype,
United States National Herbarium. Photo by Victor E. Krantz,
Staff Photographer, National Museum of Natural History.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CLXXXVII.

ADDITIONS TO *TRICHOGONIA*- AND *TRICHOGONIOPSIS*.

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Trichogonia and *Trichogoniopsis* were reviewed seven years ago in regard to generic limits (King & Robinson, 1972a, b), but at that time the prevailing concepts of the species were accepted. The review utilized in part the treatment of the Brazilian species by Barroso (1950), but the later addition, *Trichogonia prancii* Barroso (1969) was overlooked. Since that time two species have been added to *Trichogonia*, one from Bolivia and one from Bahia (King & Robinson, 1978). Now, more recent collections from Brasil and a more critical review of all the concepts has shown two listed *Trichogonia* species that should be excluded from the genus, five additional species previously undescribed, and a few new characters that seem useful in identification. A new species and new combination are also necessary in *Trichogoniopsis*.

Of the species to be omitted from *Trichogonia*, *T. scabra* Klatt is placed in the synonymy of *Campuloclinium tubaraoense* (Hieron.) K. & R. following Cabrera and Vittet (1963). *Trichogonia podocarpa* (DC) Sch. Bip. ex Baker has been studied on the basis of the original description and a microfiche of the type specimen, and it proves to be a *Trichogoniopsis* as indicated below. We have previously pointed out that *Trichogonia barrosoana* Barroso proves to be a *Campuloclinium* (King & Robinson, 1972c, 1974).

Evaluation of the remaining species is aided by the recognition of some natural groupings. The two Bolivian species, *Trichogonia bishopii* K. & R. and *T. capitata* (Rusby) B.L.Robins., share a mostly opposite-leaved condition that is unusual in the genus. Lowermost leaves may be opposite in other species but they seem to be common only in *T. rhodotricha* Malme of Brasil. The subopposite condition is common in *T. rhadinocarpa* B.L.Robins. of the northern Andes.

Among the Brazilian species, a natural group can be distinguished by the presence of numerous glands on the tube of the corolla. This same group is notable also for the tendency for a defective pappus. It includes *T. cinerea* (Benth. ex Baker) K. & R. and *T. dubia* (B.L.Robins.) K. & R. having narrow leaves, and *T. martii* Baker, *T. menthaefolia* Gardn. and *T. zehntnera* Mattf. having broad leaves. A possible member of this group is *T. eupatorioides* which is mentioned below.

The Brazilian species having about 20-30 flowers in the head,

glabrous corolla tubes, and alternately or spirally inserted leaves are further divisible by the shape of the anther appendage, a feature observable with the dissecting microscope. The appendage is longer than wide in *T. salviaeifolia* Gardn., which has mostly truncate bases on the leaf blades, and in the related species having cuneate or decurrent bases on the blades, *T. fiebrigii* Mattf. and *T. attenuata* Barroso, the latter with its finely and densely hirtellous achenes. The appendage is usually shorter than wide and often markedly bilobed in *T. campestris* Gardn., *T. spathulaefolia* Mattf., and four related species describes below, *T. herlingii*, *T. pseudocampestris*, *T. scottmorii* and *T. tombadorensis*. This latter series also tends to have more clavate tips on the style, and some of them have the pappus setae bearing numerous hairs on the outer surface as well as the margins.

Five Brazilian species, *T. hirtiflora* (DC.) Sch.Bip. ex Baker, *T. laxa* Gardn., *T. villosa* (DC.) Sch.Bip. ex Baker, and *T. grazielae* and *T. santosii* described below, can be grouped together by the 30-60 flowers in the heads, but some of these species are individually distinctive, especially the first with its short-petiolate subcordate leaves and *T. villosa* with its sessile linear leaves. *Trichogonia harleyi* K. & R. of Bahia is distinct in having only about 10 flowers in the head.

Careful study of the treatment of *Trichogonia* by Baker (1876) has shown that two synonymized species should be re-evaluated. Recognition of the misinterpretation of *Kuhnia podocarpa* DC. by Baker has necessitated re-examination of *Eupatorium conoclinioides* Gardn. which was placed in its synonymy by Baker. Typical material has not been seen, but specimens from the general area of the Type in Ceará, and the original description indicate a plant near to or the same as *T. salviaeifolia*. Also, in synonymy under *T. salviaeifolia* var. *calva* Baker is an *Iso-carpha eupatorioides* Gardn. which seems distinct. The original description by Gardner (1846) states that the receptacle is conical and paleaceous with the paleae being very small. Such a plant would not be a *Trichogonia*, but a photograph of the type in the Delessert Herbarium at Geneva shows old heads in which the receptacles seem in no way unusual for the genus. The complete lack of a pappus, combined with the broad leaf blades seems distinctive, and the following new combination is needed.

TRICHOAGONIA EUPATORIODES (Gardn.) R. M. King & H. Robinson,
comb. nov. *Isocarpha eupatorioides* Gardn., Lond. Journ.
Bot. 5: 456. 1846.

The following six species of *Trichogonia* from Brasil are described as new.

TRICHOAGONIA GRAZIELAE R. M. King & H. Robinson, sp. nov.
Plantae herbaceae perennes ca. 1 m altae in caulis foliis

et ramis inflorescentiae breviter stipitato-glanduliferae. Caules teretes striati. Folia superiora alterna, petiolis 5-10 mm longis; laminae anguste lanceolatae vel lineares plerumque 5-9 cm longae et 0.6-2.0 cm latae base anguste cuneatae margine multo valde serratae apice anguste acutae vix acuminatae supra sparse puberulae et glanduliferae, nervis secundariis utrinque 3-6 valde aequaliter ascendentes. Inflorescentiae laxae cymosae vel sub-corymbosae, ramis 4-10 mm longis. Capitula late campanulata ca. 8 mm alta et 4-5 mm lata; squamae involucri ca. 22 eximbricatae anguste ellipticae vel lanceolatae ca. 5 mm longae apice anguste acutae vel breviter attenuatae non densius pubescentes extus breviter glandulo-stipitatae. Flores ca. 35-40 in capitulo; corollae purpureae ca. 4 mm longae inferne glabrae superne minute stipitato-glanduliferae et dense puberulae, tubis ca. 1.5 mm longis, faucibus infundibularibus ca. 2 mm longis, lobis ca. 0.5 mm longis et latis; thecae antherarum ca. 1 mm longae; appendices antherarum oblongo-ovatae obtusae ca. 0.35 mm longae et 0.2 mm latae; rami stylorum apice vix clavati; achaenia ca. 2.8 mm longa inferne distincte breviter stipitata in costis breviter setifera, setis inferioribus longioribus; setae pappi ca. 20 plumosae extus glabrae plerumque ca. 2.5 mm longae. Grana pollinis ca. 18 μ m in diametro.

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, 6-7 km E of Alto Paraíso on road to Nova Roma; elev. ca. 1400 m; region of cerrado with sandstone outcrops, giving way above to grassy campo and below to mesophytic forest. Shrub 1 m tall; flowers dark purple-pink; edge of forest. 7 March 1973. *Anderson et al.* 6584 (Holotype UB). PARATYPE: BRASIL: Goiás: Chapada dos Veadeiros, a 1800 m.s.m. Flores purpúreas. 21.12.1968. *Graziela Barroso et al.* 530 (US).

Trichogonia graziellae seems closely related to the widespread *T. salviae-folia* on the basis of the elongate anther appendage and the scarcely clavate style tip, but it differs most obviously by the attenuate tips of the involucre bracts which lack the apical tuft of hairs. The new species also has a more cuneate base on the leaf blade, and the surfaces of the leaf bear numerous small stipitate glands. Also in the relationship, is *T. fiebrigii* of Paraguay, having the leaf blade narrowly decurrent on the petiole. The latter species is closer to *T. salviae-folia*, however, having the same type of involucre and leaf pubescence. The larger number of flowers in the head of *T. graziellae* also suggests relationship to *T. laxa*, but the leaf of the latter has prominent non-glandular pubescence concentrated on the veins of the leaf undersurface, has only ca. 12-14 involucre bracts in the head, and has more acute lobes on the corolla.

TRICHOGONIA HERINGERI R. M. King & H. Robinson, sp. nov.

Plantae herbaceae perennes? ca. 0.5 m altae paucae ramosae. Caules virides vel flavo-virides teretes distincte striati

sparse vel dense puberuli. Folia alterna superne remotiora, petiolis tenuibus ad 2.5 cm longis; laminae membranaceae anguste ovatae vel lanceolatae plerumque 3-6 cm longae et 0.8-2.5 cm latae base anguste cuneatae vel attenuatae margine irregulariter grosse crenatae vel duplo-crenatae apice obtusae supra puberulae et sparse minute glandulo-punctatae subtus parum pallidiores puberulae et dense glandulo-punctatae supra basem distincte trinervatae. Inflorescentiae terminales in ramis corymbosae pauci-capitatae, ramis ultimis 5-10 mm longis dense puberulis vel subtomentellis sparse glandulo-punctatis. Capitula campanulata ca. 7 mm alta et 5-7 mm lata; squamae involucri ca. 10-12 eximbricatae anguste oblanceolatae vel lineares ca. 4 mm longae apice obtusae vel breviter acutae paucae fimbriatae vel subtomentosae extus puberulae. Flores ca. 20-25 in capitula; corollae roseae 3.0-3.5 mm longae, tubis ca. 1.5 mm longis extus glabris vel subglabris, faucibus infundibularibus ca. 1.5 mm longis extus sparse glanduliferis superne sensim dense puberulis, lobis breviter triangularibus 0.4 mm longis et 0.6 mm latis extus dense puberulis; thecae antherarum ca. 1.1-1.3 mm longae; appendices antherarum breves truncatae vel retusae ca. 0.18 mm longae et 0.27 mm latae; rami stylorum apice distincte clavati. Achaenia 3.5-4.0 mm longa dense setifera persparse glandulo-punctata base anguste stipitata; setae pappi ca. 17-20 fulvescentes plerumque 2.5-3.0 mm longae inferne distincte crassiores omnino plumosae margine et extus setiferae. Granapollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Pernambuco: Entre Petrolina e Afrânio. Erva ereta inflorescência rosada, bracteas verdes. 19/4/1971. *E. P. Heringer et al.* 165 (Holotype UB). PARATYPE: BRASIL: Pernambuco: Arredores de Petrolina. Erva ereta, inflorescência roxo claro. 18/4/1971. *E. P. Heringer et al.* 123 (UB).

Trichogonia heringeri of western Pernambuco has short fulvous pappus setae with broadened bases, distinctly clavate style tips, and most other details as in the closely related *T. campestris* Gardn. described from the adjacent State of Piauh. Nevertheless, the broad deeply crenate leaf blades of the new species provide an immediate distinction, and one would not initially suspect the relationship. The new species shows the most marked development in the genus of hairs on the outer surface as well as the margins of the pappus setae, but the character occurs to some extent in *T. campestris*, *T. pseudocampestris* and *T. rhodotricha*, and even to a slight extent in some specimens of *T. salviaeifolia*. In most species of *Trichogonia*, including *T. salviaeifolia*, the outer surface of the pappus setae is flatter and appears glabrous.

TRICHOGONIA PSEUDOCAMPESTRIS R. M. King & H. Robinson, sp. nov.

Plantae herbaceae perennes vel suffruticosae ad 75 cm altae paucae ramosae. Caulis teretes striati perdense griseo-puberuli sparse glandulo-punctati. Folia alterna et saepe in axillis breviter fasciculata, petiolis ad 8 mm longis; laminae anguste

lanceolatae vel lineares plerumque 1-3 cm longae et 0.2-0.6 cm latae base anguste cuneatae vel breviter attenuatae margine multicrenulatae apice anguste obtusae vel breviter acutae supra et subtus dense puberulae et glandulo-punctatae supra basem ascendentiter trinervatae; folia superiora remotiora et minora. Inflor-
escentiae terminales paucae ascendentiter ramosae subcymosae, ramis ultimis 2-8 mm longis perdense puberulis et minute glandulo-punctatis. Capitula campanulata 8 mm alta et 4-5 mm lata; squamae involucri ca. 12 eximbricatae lineares 4-5 mm longae apice dense tomentosae primum visum obtusae vel truncatae extus dense puberulae et minute glandulo-punctatae. Flores ca. 27 in capitulo; corollae lavandulae ca. 3.5 mm longae, tubis ca. 1.5 mm longis extus glabris, faucibus infundibularibus ca. 1.7 mm longis puberulis inferne minute stipitato-glanduliferis superne minute glandulo-punctatis, lobis triangularibus ca. 0.5 mm longis et latis extus dense puberulis; thecae antherarum ca. 1 mm longae; appendices antherarum breves apice truncatae vel subtruncatae ca. 0.1 mm longae et 0.23 mm latae; rami stylorum apice distincte clavati. Achaenia ca. 2.7 mm longa plerumque in costis dense tenuiter setifera plerumque inter costas et ad apicem minute stipitato-glandulifera base non stipitata; setae pappi ca. 20 fulvescentes vel rubrescentes plerumque ca. 2.5 mm longae plumosae margine et extus setiferae. Grana pollinis ca. 20 μ m in diametro.

TYPE: BRASIL: Bahia: ca. 2 km SW of the town of Morro do Chapéu, on the Utinga road. Approx. 41°10'W, 11°34'S. Alt. ca. 1000 m. Disturbed and cut-over caatinga transitional to Mata de Cipó, and associated roadside vegetation. Pretty herb to ca. 25 cm. Leaves grey-green. Phyllaries grey-green. Corolla bright pinkish-purple. Styles pinkish-purple below and showy white stigmas above. 3 March 1977. *Harley et al.* 19320 (Holotype CEPEC, isotype US). PARATYPES: BRASIL: Bahia: Serra da Agua de Rega, ca. 23 km N of Seabra, road to Agua de Rega, elev. ca. 1000 m. Cerrado and occasional tree islands. Herb to ca. 50 cm tall. Heads very pale lavender-pink. 24 Feb. 1971. *Irwin et al.* 30900 (US); ca. 24 km N of Seabra, road to Agua de Rega, elev. ca. 1000 m. Cerrado on slopes. Subshrub to ca. 75 cm tall. Corolla pale pink. 24 Feb. 1971. *Irwin et al.* 30962 (US).

The new species has the narrow leaves, short anther appendage and clavate tips of the style branches that indicate relationship to *T. campestris* Gardn. The pappus setae are also similar in having hairs on both the margins and outer surface. Still, the pappus setae of the new species are not as obviously broadened at the base. More significantly, the involucre bracts of *T. pseudocampestris* have more obtuse and densely tomentose tips, and the achenes lack narrowly stipitate bases. The minute stipitate glands of the achenes also seem distinctive, most related species having only the short-stalked form of capitate gland.

TRICHOGONIA SANTOSII R. M. King & H. Robinson, sp. nov.

Plantae herbaceae perennes ad 50 cm altae viscosae, ramis erectis vel ascendentibus. Caules teretes striati vel costati dense breviter stipitato-glanduliferi et sparse hirtelli. Folia alterna, petiolis ad 10 mm longis; laminae lanceolatae vel lineari-lanceolatae plerumque 2-4 cm longae et 0.4-0.9 cm latae base anguste cuneatae margine crenato-serrulatae vel subintegrae apice breviter acutae supra et subtus canescentiter hirtellae et dense glandulo-punctatae, nervis secundariis valde ascendentibus primum visum trinervatis. Inflorescentiae terminales cymosae pauci-capitatae, ramis ultimis 4-15 mm longis dense hirtellis et stipitato-glanduliferis. Capitula late campanulata ca. 10 mm alta et 10-12 mm lata; squamae involucri ca. 20 eximbricatae lineari-ellipticae plerumque 7 mm longae ad 2 mm latae apice subacutae dense tomentosae extus dense puberulae et minute glandulo-punctatae. Flores ca. 40 in capitulo; corollae lavandulae 4.0-4.5 mm longae, tubis ca. 1.5 mm longis extus glabris, faucibus leniter infundibularibus 2.0-2.5 mm longis extus plerumque dense puberulis et glandulo-punctatis, lobis acutis ca. 0.7 mm longis et 0.6 mm latis extus dense puberulis, cellulis pilorum saepe ad 50 μ m longis; thecae antherarum 1.3-1.5 mm longae; appendices antherarum breves ca. 0.2 mm longae et 0.25 mm latae apice truncatae vel retusae; appendices stylorum base tenues apice distincte clavatae. Achaenia 4.5-5.0 mm longa dense villosula inter costas sparse glandulo-punctata base stipitata; setae pappi ca. 20 albae vel pallide rubescentes ca. 3.5 mm longae longe plumosae margine et extus piliferae, pilis saepe ad 0.5 mm longis. Grana pollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Bahia: Serra do Açuruá, 1.5 km S of São Inácio on Gentio do Ouro road. Cerrado on shallow rocky soils. Approx. 42°44'W, 11°07'S. Alt. ca. 500 m. Viscid herb with erect to ascending stems to ca. 50 cm. Leaves grey-green with undulate margin. Phyllaries pale greyish-green. Flowers pink-lilac, whitish in bud. 24 Feb. 1977. *R.M. Harley, S.J. Mayo, R.M. Storr, T.S. Santos & R.S. Pinheiro 18987* (Holotype CEPEC, isotype US).

The new species seems closest to *T. laxa* Gardn. of Goiás, and has more sharply acute corolla lobes as in that species, but the latter has densely stipitate-glandular leaves and involucre, dense pubescence concentrated on the veins of the leaf under-surface, has only ca. 12-14 involucre bracts on the head, and has achenes with pubescence almost completely restricted to the ribs. The new species is most like *T. pseudocampestris*, among the Bahian members of the genus, but the latter species has smaller heads with fewer bracts and flowers, has less pointed corolla lobes, and has achenes lacking a stipitate base and bearing minute stipitate glands.

TRICHOGONIA SCOTTII R. M. King & H. Robinson, sp. nov.

Plantae herbaceae perennes ca. 0.5 m altae pauce ramosae in caulis petiolis et bracteis involucri minute stipitato-glanduli-

ferae. Caules virides vel flavo-virides teretes distincte striati. Folia alterna vel raro subopposita plerumque remota, petiolis distinctis tenuis plerumque 7-11 mm longis; laminae deltoideae vel ovatae plerumque 1.5-2.4 cm longae et 0.7-1.4 cm latae base plerumque truncatae vel late obtusae in medio in partibus trinervatis breviter cuneatae margine utrinque 5-7 crenato-serrulatae apice acutae supra pilosae et sparse glandulo-punctatae subtus leniter pallidiores dense glandulo-punctatae plerumque in nervis et nervulis pilosae, nervis secundariis e basis valde ascendentibus. Inflorescentiae terminales valde cymosae in ramis corymbosae, ramis ultimis 3-5 mm longis dense stipitato-glanduliferis et sparse vel dense hirsutis. Capitula campanulata ca. 9 mm alta et 5 mm lata; squamae involucri ca. 13 eximbricatae anguste ellipticae vel oblanceolatae ca. 6 mm longae et 0.8-1.2 mm latae apice acutae dense fimbriatae vel subtomentosae extus breviter stipitato-glanduliferae et glandulo-punctatae. Flores ca. 25 in capitulo; corollae lavandulae ca. 5 mm longae, tubis ca. 3 mm longis extus glabris, faucibus late infundibularibus ca. 1.5 mm longis extus sparse glandulo-punctatis superne sensim dense puberulis, lobis triangularibus ca. 0.4 mm longis et latis apice acutis extus dense puberulis, pilis brevibus biserialis in faucibus superioribus perpaucis; thecae antherarum ca. 1.2 mm longae; appendices antherarum oblongae ca. 0.16 mm longae et 0.18 mm latae; rami stylorum apice leniter latiores. Achaenia 3.5-4.0 mm longa in costis et superne longe setifera base anguste stipitata in basis et in callis apicalibus glandulo-punctata; setae pappi ca. 22 albae plerumque ca. 3.5-4.0 mm longae inferne leniter latiores praeter apicem longe plumosae extus plerumque glabrae. Grana pollinis ca. 20 μ m in diametro.

TYPE: BRASIL: Bahia: Município de Maracás. BA 250, 40 km a E de Maracás AH. ca. 800 m. Regiões de Mata de Cipó. Vegetação perturbada. Uncommon herbs to $\frac{1}{2}$ meter tall, flowers lavender. *R.M. King & S. Mori 8018* (Holotype CEPEC).

Within Bahia, the new species finds closest resemblance to *T. pseudocampestris* which differs by the non-stipitate bases of the achenes and by the narrow leaf blades, and *T. tombadorensis* which differs by the densely spirally inserted short-petioled leaves and the condensed inflorescence. The less broadened style tips and the form of pappus setae in the new species are indicative of closer relationship to *T. salviaefolia*, however. The latter species, which occurs widely farther westward and southward in Brasil, differs by having anther appendages clearly longer than wide, having more lanceolate leaves with closely crenulate margins, and having the trinervation of the leaf blade from slightly to distinctly above the base.

TRICHOGONIA TOMBADORENSIS R. M. King & H. Robinson, sp. nov.

Plantae suffruticosae ca. 75 cm altae paucae ramosae. Caul-es dense pallide puberuli et glandulo-punctati inferne fissurate corticati. Folia dense spiraliter inserta et in axillis dense

fasciculata, petiolis ad 7 mm longis; laminae ellipticae vel obovatae plerumque 5-7 mm longae et 3-5 mm latae base breviter acutae margine integrae apice rotundatae supra et subtus dense puberulae et glandulo-punctatae, nervis secundariis paucis brevibus ascendenter pinnatis subtus vix vel non prominulis. Inflorescentiae abrupte terminales alterne ramosae subdense corymbosae, ramis dense puberulis et glandulo-punctatis subtomentellis, ramis ultimis 7-10 mm longis. Capitula campanulata ca. 8 mm alta et 4 mm lata; squamae involucri ca. 12 eximbricatae lineares 4-5 mm longae apice dense tomentosae primum visum obtusae vel truncatae extus dense puberulae et glandulo-punctatae. Flores ca. 25-27 in capitulo; corollae lavandulae 4.0-4.5 mm longae, tubis ca. 1.5-2.0 mm longis extus glabris vel superne sparse glanduliferis, faucibus infundibularibus ca. 1.5-2.0 mm longis superne puberulis et sparse minute stipitato-glanduliferis, lobis ca. 0.5 mm longis et latis extus dense puberulis et sparse glandulo-punctatis; thecae antherarum ca. 1.5 mm longae; appendices antherarum breves ca. 0.15 mm longae et 0.23 mm latae apice truncatae vel retusae; rami stylorum apice distincte clavati. Achaenia ca. 4 mm longa plerumque in costis dense longe setifera inter costas glandulo-punctata base anguste stipitata; setae pappi 18-20 plumosae plerumque 3.5-4.0 mm longae. Grana pollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Bahia: Serra do Tombador. ca. 22 km W of Morro do Chapéu, elev. ca. 1000 m. Caatinga scrub on sand with sandstone outcrops. Subshrub ca. 75 cm tall. Heads lavender-pink (mostly dried). 20 Feb. 1971. *H.S. Irwin, R.M. Harley & G.L. Smith 30671* (Holotype US).

Trichogonia tombadorensis is closely related to *T. spathulifolia* Mattf. which was described from somewhat farther south in the Rio de Contas region of Bahia. The leaves of both species are reduced and prominently borne in axillary fascicles, and the shape of the anther appendages and style tips is the same. The new species differs markedly, however, in the density of the foliage and the abruptness and density of the inflorescence. More subtle differences include the shorter elliptical rather than spathulate leaf-blade with pubescence not denser below, the secondary veins of the leaf being scarcely or not at all prominent, and the pappus having 18-20 setae rather than 25-30.

The species of the genus *Trichogoniopsis* seem to have been particularly subject to misinterpretation. It has already been shown that the earliest name for the type species, *Eupatorium adenanthum* DC., had been misapplied in most treatments to a species now placed in *Macropodina* (King & Robinson, 1972b). Now, the second species of the genus seems to have had an earlier name that has been misapplied to a species of *Trichogonia* by Baker (1876). The original description of *Kuhnia podocarpa* DC. indicates a plant from the maritime Restinga habitat near Rio de

Janeiro having a plumose pappus and glabrous or nearly glabrous ribs of the achene. A microfiche of the type at Geneva indicates a plant with stouter stems than any specimen of *Trichogonia* in the area, but the stem, the leaf shape, and the achenes are precisely like those of *Trichogoniopsis* specimens distributed under the name *Eupatorium macrolepis* Baker from the Restinga habitats near Rio de Janeiro. The Candolle name has priority over that of Baker and the following new combination is necessary.

TRICHOGONIOPSIS PODOCARPA (DC.) R. M. King & H. Robinson, comb. nov. *Kuhnia podocarpa* DC., Prodr. 5: 126. 1836.

The following new species has also been encountered.

TRICHOGONIOPSIS MORII R. M. King & H. Robinson, sp. nov.

Plantae herbaceae vel suffrutescentes perennes mediocriter ramosae ad 1.0-1.5 m altae. Caules in parte purpurascences teretes vix vel non striati minute dense stipitato-glanduliferi et inferne breviter hirsuti. Folia opposita, petiolis 3-10 mm longis; laminae ovatae plerumque 1.5-3.2 cm longae et 0.8-2.5 cm latae base truncatae ad mediam breviter acuminatae margine grosse utrinque ca. 6-crenato-serratae vel duplo-crenatae apice obtusae vel breviter acutae supra sparse pilosae sparse glandulo-punctatae subtus pallidiores subdense glandulo-punctatae et sparse minute stipitato-glanduliferae in nervis et nervulis majoribus pilosae fere ad basem trinervatae. Inflorescentiae in ramis terminales laxae alterne ramosae paucae capitatae, ramis dense minute stipitato-glanduliferis, ramis ultimis 1-2 cm longis. Capitula ca. 1 cm alta et ca. 0.7 cm lata; squamae involucri ca. 18 virides membranaceae non foliaceae subaequales lineari-lanceolatae vel lineares 7-8 mm longae et plerumque 0.8 mm latae apice filiformiter attenuatae margine puberulo-fimbriatae extus valde bicostatae et dense minute stipitato-glanduliferae. Flores 25-30 in capitulo; corollae albae 5.0-5.5 mm longae, tubis ca. 2.5 mm longis intus costatis extus glabris, faucibus inferne tubiformibus ca. 1 mm longis superne abrupte campanulatis et ipse ca. 1 mm longis extus glabris, lobis ca. 1 mm longis et 0.7 mm latis extus sparse breviter setiferis et glanduliferis; filamenta in parte superiore 0.4-0.5 mm longa; thecae antherarum ca. 1.5 mm longae; appendices antherarum ca. 0.17 mm longae et 0.24 mm latae breviter retusae. Achania 4.5-5.0 mm longa hispidula inferne anguste stipitata; setae pappi 20-25 plumosae 4.0-4.5 mm longae. Grana pollinis 22-23 μ m in diametro.

TYPE: BRASIL: Bahia: Municipio de Mucugê. Estrada que liga Mucugê, 17 km de Mucugê. Campo Rupestre. Herb with woody base, 1-1½ meters tall, flowers white. July 27, 1979. R.M.King, S.Mori, T.S.Santos & J.Hage 8178 (Holotype RB, isotypes CEPEC, US).

Trichogoniopsis morii shares most of the general aspect of the other two members of the genus, and the shortly pointed

leaves are approached closely by some specimens of both other species. However, a number of less obvious differences are present. The new species completely lacks the tendency toward oblanceolate somewhat foliaceous outer involucre bracts seen in both *T. adenantha* (DC.) K. & R. and *T. podocarpa* (DC.) K. & R., and the branches of the inflorescence and outer surfaces of the involucre bracts bear only minute stipitate glands without coarser non-glandular hairs. The new species is also distinct in the somewhat sparser glandular-punctations, the more restricted pilosity, and the presence of minute stipitate glands on the leaf undersurface. The appendages of the anthers are only short-retuse, while those of the other species are narrowly divided more than halfway to the base. The two halves of the appendages in the latter two species can be seen under a dissecting microscope as two separate lobes. The new species represents a northward extension of the range of the genus, which has been known previously from southern Minas Gerais southward to São Paulo.

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Acknowledgement

We would like to thank the following people for their help in the project. Dr. Dourimar Nunes de Moura, Superintendent for International Cooperation, Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) Brasília, Dr. Paulo Alvim, Director of Research, and Dr. Scott A. Mori, Curator of the Herbarium, both of the Centro de Pesquisas do Cacau (CEPEC), Itabuna.



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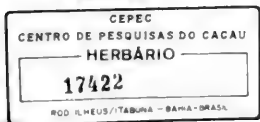
Trichogonia grazielae R. M. King & H. Robinson, Holotype,
Herbário Universidade de Brasília. Photos by Victor E. Krantz,
Staff Photographer, National Museum of Natural History.



Trichogonia heringeri R. M. King & H. Robinson, Holotype,
Herbário Universidade de Brasília



Trichogonia pseudocampestris R. M. King & H. Robinson,
Holotype, Herbário Centro de Pesquisas do Cacau (CEPEC), Itabuna,
Bahia.



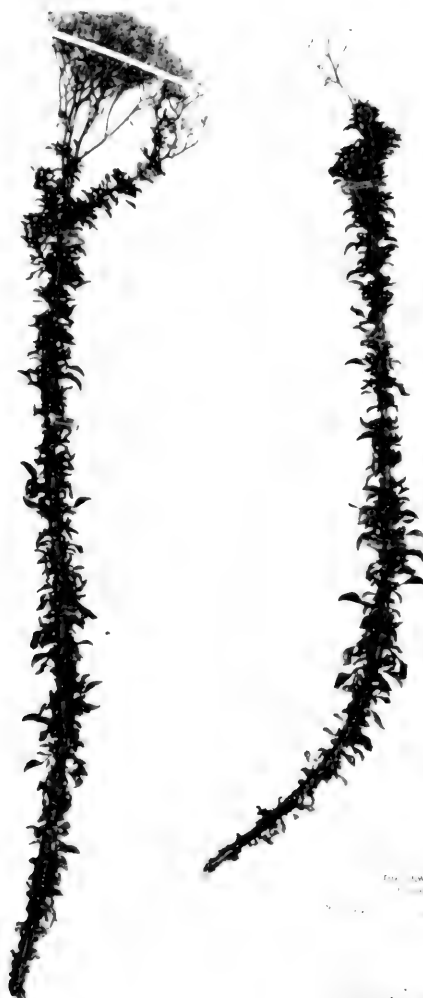
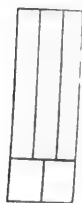
Trichogonia santosii R. M. King & H. Robinson, Holotype,
Herbário Centro de Pesquisas do Cacau (CEPEC), Itabuna, Bahia.



A. GRACEAE of BAHIA, BRAZIL

17250

Trichogonia scottmorii R. M. King & H. Robinson, Holotype,
Herbário Centro de Pesquisas do Cacau (CEPEC), Itabuna, Bahia.



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Trichogonia tombadorensis R. M. King & H. Robinson, Holotype,
United States National Herbarium.



ASTERACEAE of BAHIA, BRAZIL

Trichogoniopsis morii R. M. King & H. Robinson, Holotype,
Jardim Botânico, Rio de Janeiro.



Enlargements of heads. Top. *Trichogonia graxielae*, *T. herlingeri*, *T. pseudocampestris*. Middle. *Trichogonia santosi*, *T. scottmorii*. Bottom. *Trichogonia scottmorii*, *Trichogoniopsis morii*.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CLXXXVIII.

NEW SPECIES OF *MIKANIA* FROM BRASIL.

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Attempts to identify Asteraceae from Brasil have resulted in the recognition of the following eight previously undescribed species of *Mikania*.

MIKANIA ALVIMII R. M. King & H. Robinson, sp. nov.

Plantae erectae ad 60 cm altae. Caules fistulosi hexagonales costati glabri. Folia opposita sessilia; laminae subcarnosae ellipticae vel obovatae plerumque 4-7 cm longae et 1.2-2.8 cm latae base cuneatae margine integrae vel superne subtiliter remote subcrenulatae apice rotundatae vel vix obtusae utrinque glabrae e basis quinquenervatae, nervis lateralibus minoribus, nervulis subtus prominulis. Inflorescentiae terminales corymboso-paniculatae in internodiis inferioribus elongatae, ramis paucis valde ascendentibus plerumque glabris, ramulis ultimis plerumque 3-8 mm longis sparse tenuiter puberulis; bracteis inferioribus subfoliaceis maxime 1.8 mm longae et ca. 4 mm latae; bracteis superioribus minutis. Capitula ca. 9 mm alta; bractea subinvolutralis nulla vel remota membranacea linearis ca. 4 mm longa; bractee involucae oblongo-ellipticae 5.0-6.0 mm longae apice breviter acutae margine lateraliter pallidae anguste scariosae extus fusco-virides glabrae. Corollae albae 6.0-6.5 mm longae, tubis supra basem cylindraceis ca. 2.3 mm longis extus glabris, faucibus abruptis leniter campanulatis ca. 2 mm longis extus glabris intus laevibus, lobis oblongo-ovatis ca. 2 mm longis et ca. 1 mm latis margine dense puberulo-fimbriatis extus persparse puberulis, nervis loborum solitariis distincte intramarginalibus; filamenta in partibus inferioribus ca. 1 mm longa et 0.15-0.17 mm lata in partibus superioribus ca. 0.35 mm longa superne leniter angustiora; thecae fuscescentes ca. 1.8-2.0 mm longae; appendices antherarum oblongo-ovatae ca. 0.6 mm longae et 0.3 mm latae; nectarium cylindricum ca. 0.1 mm altum; scapi stylorum vix incrassati; appendices stylorum non attenuatae perdense patentiter longe papillosae. Achaenia ca. 4.5 mm longa prismatica 5-costata plerumque glabra superne sensim puberula inferne sensim angustiora, carpodia discreta minute obturaculiformia; setae pappi ca. 35 plerumque 5.5-6.5 mm longae superne leniter latiores, cellulis apicalibus vix densioribus et subacutis. Grana pollinis ca. 25 μ m in diametro.

TYPE: BRASIL: Bahia: Município de Rio de Contas. Base de Pico das Almas, a 18 km ao NW de Rio de Contas. Elev. 1300 m. Common herbs, flowers white. July 24, 1979. *R.M.King, S.Mori, T.S.Santos & J.Hage 8126* (Holotype RB, isotypes CEPEC, US). PARATYPES; BRASIL: Bahia: Lower slopes of the Pico das Almas, ca. 25 km WNW of the town of Rio de Contas. Approx. $41^{\circ}55'W$, $13^{\circ}32'S$. Alt. approx. 1500 m. "Carresco" scrub vegetation among rocks, with occasional wet flushes, and some areas partly burnt over. Herb to ca. 60 cm. Fleshy green leaves. Bracteoles green. Flowers clear white. 24 Jan. 1974. *R.M.Harley, S.A.Renvoize, C.M.Erskine, C.A.Brighton & R.Pinheiro 15478* (US); Lower NE slopes of the Pico das Almas, ca. 25 km WNW of the Vila do Rio de Contas. Approx. $41^{\circ}57'W$, $13^{\circ}33'S$. Alt. 1500 m. Sandstone, metamorphic and quartzite rock outcrops with associated marsh and damp flushes. Herb to 50 cm. Leaves slightly fleshy, mid-green above, paler beneath. Phyllaries pale green with brown tips. Pappus off-white. 17.2.77. *R.M.Harley, S.J.Mayo, R.M.Storr, T.S.Santos & R.S.Pinheiro 19563* (US).

Mikania alvimii is rather distinct in the erect stems branching only near the base. The inflorescence is an elevated corymbose panicle. The lobes of the corolla have a prominent fringe of marginal hairs. The closest relative seems to be *M. oxylepis* Sch.Bip. ex Baker of Minas Gerais, but that species has strongly toothed rather than entire leaves, and has sharply pointed involucre bracts.

The species is named for Dr. Paulo Alvim, Director of Research, at the Centro de Pesquisas do Cacau, Itabuna, Bahia.

MIKANIA BELEMII R. M. King & H. Robinson, sp. nov.

Plantae volubiles. Caules anguste fistulosi fuscescentes teretes striati plerumque in sulcis minute appresse puberuli. Folia opposita, petiolis ad 17 mm longis; laminae membranaceae ovatae vel oblongo-ovatae plerumque 6-9 cm longae et 2.2-3.5 cm latae base rotundatae vel breviter acuminatae margine integrae apice distincte late vel anguste acuminatae supra glabrae vel glabrescentes subtus sparse plerumque in nervis minute appresse puberulae fere ad basem valde trinervatae; reticulo nervulorum distincto subtus leniter prominulo. Inflorescentiae pyramidaliter thyrsoides-paniculatae, ramulis dense puberulis vel hirtellis, ramulis ultimis 2-4 mm longis; bracteis primariis foliaceis ellipticis plerumque 1-5 cm longis; bracteis secundariis valde minoribus. Capitula ca. 7 mm alta; bractea subinvolucralis membranacea lanceolata ca. 2-3 mm longa et ca. 0.6-0.8 mm lata glabra; bractee involucri chartaceae oblongae ca. 4.0-4.5 mm longae et 1.2-1.5 mm latae apice obtusae vel rotundatae margine superne minute puberulo-fimbriatae extus glabrae. Corollae albae ca. 4.5 mm longae, tubis cylindricis ca. 2 mm longis extus puberulis, faucibus abrupte late campanulatis ca. 0.8 mm longis extus glabris intus laevibus, lobis oblongo-ovatis ca. 1.5 mm longis et ca. 0.6 mm latis margine et apice minute puberulis,

nervis marginalibus duplicibus; filamenta in partibus inferioribus ca. 0.8 mm longa et 0.1 mm lata in partibus superioribus ca. 0.2 mm longa base 0.12 mm lata; thecae pallidae ca. 1.2 mm longae; appendices antherarum breviter oblongae ca. 0.25 mm longae et latae; nectarium breviter cylindricum ca. 0.4 mm altum; basi stylorum leniter noduliferi; appendices stylorum vix vel non attenuatae distincte complanatae distincte minute papillosae. Achaenia ca. 4.0 mm longa prismatica 5-costata sparse puberula base sensim angustiores subcarnosa, pilis uniseriatis in cellulis apicalibus breviter clavatis; setae pappi ca. 50 plerumque 4-5 mm longae longiores in apicem leniter latiores, cellulis apicalibus vix densioribus vix obtusioribus. Grana pollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Bahia: Município de Ilhéus. Rod. BR 415, trecho Ilhéus/Itabuna, km 12. Region de Mata Higrofila Sul Baiana, ca. 50 m de alt. Margem da rodovia. Common vines in trees, flowers grey-white. July 10, 1979. *R.M.King & L.A.Mattos Silva 8007* (Holotype RB, isotypes CEPEC, US). PARATYPES: BRASIL: Bahia: Rodovia Camacan - Itabuna. Plantação de Cacau. Cipó. Flores brancas, involúcro verde, caule piloso. 29-7-1965. *Belém 1416* (US); Santa Cruz Cabralia, (BA). Mata costeira. Cipó sobre árvore de 15 m; flores brancas. 16.7.1966. *R.P.Belém & R.S. Pinheiro 2597* (CEPEC); Porto Seguro, BR 5. Planta de Formacás secundária. 25-8-1961. *A.P.Duarte 6003* (RB, US); Município de Alcobaça. Rod. BA 001, trecho Alcobaça/Prado, a 5 km a NW de Alcobaça. Restinga. Folha SE - 24 (18039a). Cipó. 9-17-1978. *S.Mori, L.A.Mattos Silva & T.S.dos Santos 10585* (CEPEC); Ba. Rod. Lagoa Encantada Mata solo arenoso. Trepadeira fl. branca perfumada. 23.7.71. *R.S.Pinheiro 1480* (CEPEC, US); BA. Itiua Município de Nilo Peçanha Mata-restinga. Trepadeira sobre árvore flor branca. 19.6.73. *T.S.Santos 2674* (CEPEC, US).

On the basis of the thyrsoid-paniculate inflorescences, the spreading short-throated limb of the corolla, and the double veins of the corolla lobes, the new species would come close to *M. lindleyana* DC. and *M. salviaefolia* Gardn. in the treatment by Barroso (1958). The latter species differs by its leaves having hastate bases and tomentose undersurfaces. *Mikania lindleyana* differs by having large subinvolucral bracts 5-6 mm long, and having achenes and peduncles glabrous or nearly glabrous.

MIKANIA GRAZIELAE R. M. King & H. Robinson, sp. nov.

Plantae volubiles. Caules atro-brunnescentes non fistulosi hexagonales plerumque glabrescentes in nodis sensim dense puberuli vel tomentelli. Folia opposita, petiolis distinctis plerumque 2-7 mm longis; laminae herbaceae late ovatae ca. 1.4-3.4 cm longae et 1.2-3.5 cm latae base truncatae vel vix cordatae ad medio in partibus trinervatis breviter acutae margine integrae vel leniter undulatae apice anguste rotundatae supra glabrae in nervis et nervulis insculptae subtus distincte breviter puberulae et dense glandulo-punctatae in nervis et nervulis exsculptae

longius puberulae. Inflorescentiae in ramis lateralibus terminales thyrsoidae-paniculatae, ramis corymbosis tenuiter puberulis, ramis ultimis 1-5 mm longis dense puberulis, bracteis primariis foliiformibus in laminis plerumque 8-12 mm longis et 7-12 mm latis, bracteis in ramulis squamiformibus ca. 2 mm longis. Capitula anguste campanulata 8-9 mm alta et ca. 3 mm lata; bractea subinvolucralis herbacea elliptica ca. 3.5 mm longa et 3.0 mm lata minute puberula et glandulo-punctata; bractee involucricae oblongae ca. 5 mm longae et 2.2-2.5 mm latae base leniter subcarnosae gibbosae apice late rotundatae et saepe minute apiculatae margine anguste scariosae et sensim pallidiores extus ad medio sparse puberulae. Corollae cremaeae aliquantum salverformes ca. 6 mm longae extus in tubis et faucibus dense puberulis, tubis cylindraceis ca. 3.5 mm longis, faucibus breviter infundibularibus ca. 1.5 mm longis, lobis oblongis ca. 2 mm longis et 1 mm latis extus superne parce puberulis ad apicem dense minute glandulo-punctatis; filamenta in partibus inferioribus ca. 1 mm longa et 0.2 mm lata in partibus superioribus 0.20-0.25 mm longa et base ad 0.25 mm lata; thecae atro-violaceae ca. 1.5 mm longae; appendices antherarum oblongo-ovatae ca. 0.4 mm longae et 0.3 mm latae; nectarium cylindricum ca. 1 mm altum; scapi stylorum leniter incrassati; appendices stylorum solum ad apicem sensim angustiores ubique dense papillosae. Achaenia ad 4 mm longa prismatica 5-costata base leniter angustiora base perdense puberula superne plerumque in costis puberula superne pilis biseriatis longis contortis et in parte retrorsis dense obiecta in costis minute papillosa; setae pappi biseriatae ca. 60 longiores ad 6 mm longae apice leniter latiores, cellulis apicalibus obtusioribus. Grana pollinis plerumque ca. 23-25 μ m in diametro.

TYPE: BRASIL: Bahia: Município de Mucugê, a 3 km ao S de Mucugê. Na estrada que vai par Jussiape. Elev. ca. 1000 meters. Vine, flower cream-white, fragrant. July 26, 1979. R.M.King, S.Mori, T.S.dos Santos & J.Hage 8159 (Holotype RB, isotypes CEPEC, US).

Mikania grazielae has some resemblance to *M. phaeoclados* Mart. ex Baker of Bahia, Espírito Santo and Minas Gerais, but is apparently not closely related, differing by the broader more entire leaves, the broader bracts of the involucre, the deeply divided limb of the corolla, and the different achene pubescence. The inflorescence is also more cylindrically paniculate and the bracts of the inflorescence branches are short and blunt. The achene of the new species is the most distinctive feature, having large contorted retrorse setae on the upper part that seem almost like an outer pappus, and having a dense felt of finer hairs basally above the carpodium.

The densely foliate vine with dense panicles of heads presents a rather striking appearance. It is with pleasure that it is named here for Dr. Graziela M. Barroso of the Jardim Botânico, Rio de Janeiro, who has written the only recent treatment of the genus *Mikania* for Brasil.

MIKANIA HAGEI R. M. King & H. Robinson, sp. nov.

Plantae fruticosae ad 1 m altae. Caules atro-brunnescentes non fistulosi multi-angulati dense glandulo-punctati. Folia verticillata in nodis 3-4, petiolis ca. 5-10 mm longis; laminae obovatae plerumque 2.5-5.0 cm longae et 1.7-3.4 cm latae base cuneatae vel anguste acuminatae margine integrae vel leniter crenulatae apice rotundatae supra et subtus dense glandulo-punctatae supra basem valde trinervatae, nervulis vix vel non prominulis. Inflorescentiae terminales thyrsoido-paniculatae in ramis paniculatis, ramis puberulis et glandulo-punctatis, ramulis ultimis plerumque ca. 2 mm longis; bracteis primariis foliiformibus plerumque 1.5-3.5 cm longis, bracteis ultimis et subinvolucralibus anguste ellipticis vel sublinearibus ca. 3 mm longis et 1 mm latis puberulis et glandulo-punctatis. Capitula anguste cylindrica ca. 1 cm alta; bracteeae involucri oblongae ca. 4 mm longae et 2 mm latae apice rotundatae margine anguste distincte scariosae extus glandulo-punctatae et minute puberulae. Corollae albae ca. 6.5 mm longae, tubis late cylindraceis ca. 2 mm longis extus glandulo-punctatis, faucibus anguste campanulatis ca. 3.5 mm longis sparse glandulo-punctatis intus laevibus, lobis triangularibus ca. 1 mm longis et latis extus glandulo-punctatis; filamenta in partibus inferioribus ca. 2.5 mm longa et ca. 1.7 mm lata in partibus superioribus ca. 0.7 mm longa et 0.15 mm lata; thecae pallidae ca. 1.7 mm longae; appendices antherarum oblongae ca. 0.35 mm longae et 0.25 mm latae; nectarium breviter cylindricum ca. 0.4 mm altum; scapi stylorum leniter incrassati, superne et in ramis inferioribus abaxialiter sparse puberuli, pilis uniseriatis 1-2-septatis, rami stylorum in partibus stigmataceis superioribus et appendicibus inferioribus saepe abaxialiter glandulo-punctati, appendices stylorum lineares dense breviter papillosae apice vix angustiores. Achaenia ca. 4 mm longa prismatica 5-costata dense glandulo-punctata base et apice et in costis breviter multo setifera base sensim leniter angustiora, carpopodia indiscreta breviter rotundata; setae pappi ca. 40 plerumque 7-8 mm longae apice distincte anguste clavatae, cellulis apicalibus plerumque obtusis. Grana pollinis ca. 25 μ m in diametro.

TYPE: BRASIL: Bahia: Municipio de Rio de Contas. Base de Pico das Almas, a 18 km ao NW de Rio de Contas. Elev. ca. 1300 meters. Shrub one meter tall, flowers white. July 22, 1979. R.M.King, S.Mori, T.S.dos Santos & J.Hage 8101 (Holotype RB, frag. US).

Mikania hagei is one of a few species in the genus with an erect habit and verticillate leaves on the primary stems. The characters place the species closest to *M. subverticillata* Sch. Bip. ex Baker of Minas Gerais, but that species has subcoriaceous, glabrous, dentate leaves. The aspect and the sulcate stems are similar to *M. neurocaula* DC. and *M. rothii* Barroso, both of Minas Gerais, but the leaves of the latter are described as opposite and they are pilose or tomentose. The related species

should be examined for style pubescence of the type seen in *M. hagei*.

MIKANIA INORDINATA R. M. King & H. Robinson, sp. nov.

Plantae volubiles. Caules brunnescentes fistulosi subhexagonales striati plerumque in nodis sparse minute puberuli et persparse minute glandulo-punctati. Folia opposita, petiolis ad 5.5 cm longis base sensim incrassatis et breviter alatis; laminae ovatae vel deltoideae ca. 8 cm longae et 5-6 cm latae base subtruncatae vel subcordatae in medio in parte trinervatae cuneatae margine integrae apice anguste acutae supra sparse minute pilosae et glandulo-punctatae subtus pallidiores sparse minute puberulae et glandulo-punctatae. Inflorescentiae in ramis terminales pyramidaliter paniculatae in ramulis subcorymbosis, capitulis apicalibus procrastinatis, ramulis ultimis plerumque 1-3 mm longis sparse glandulo-punctatis et dense puberulis vel subtomentellis, bracteae omnino minutae solum infimae minute foliiformes ad ca. 1 cm longae breviter petiolatae. Capitula anguste cylindrica ca. 10 mm alta et ca. 2.5 mm lata; bractea subinvolucralis linearis ca. 2.5 mm longa; bracteae involucri anguste oblongae ca. 7 mm longae et 1.2-1.5 mm latae apice acutae margine anguste scariosae extus minute glandulo-punctatae superne sensim dense puberulae vel subtomentellae. Corollae albae salverformes ca. 5 mm longae, tubis supra basem anguste cylindraceis ca. 3 mm longis extus persparse puberulis et glandulo-punctatis, faucibus abrupte late infundibularibus ca. 1 mm longis extus glabris vel persparse minute glandulo-punctatis intus laevibus, lobis oblongo-ovatis ca. 1 mm longis et 0.6 mm latis extus superne dense glandulo-punctatis subapice pauca minute puberulis; filamenta in partibus inferioribus ca. 1 mm longa et 0.13 mm lata in partibus superioribus ca. 0.2 mm longa et base 0.15 mm lata; thecae purpurascentes ca. 1.2 mm longae; appendices antherarum oblongae ca. 0.25 mm longae et 0.23 mm latae; nectarium cylindricum ca. 0.6 mm altum et 0.5-0.6 mm latum; scapi styli vix vel non incrassati glabri; appendices styli lineares dense breviter papillosae apice vix angustiores. Achaenia ca. 3.5-4.0 mm longa prismatica 5-costata base puberula vel in partibus subtomentellis persparse glandulo-punctata apice plerumque in costis retrorse contorte setifera plerumque in costis minute papillosa base sensim angustiora; carpodia distincte cylindrica; setae pappi ca. 2-seriatae 70-75 plerumque 4-5 mm longae dense scabridulae superne leniter latiores, cellulis apicalibus breviter acutis. Grana pollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Bahia: Municipio de Maracás. Fazenda do Pássaros. A 24 km a E de Maracás. AH ca. 900 m. Mata de Cipo, perturbada. Common vines to 3 meters above ground, flowers white. July 13, 1979. R.M. King & S. Mori 802L (Holotype CEPEC).

Mikania inordinata has a habit reminiscent of the *M. scandens* group, though the leaf blades are not cordate and the inflorescence is not corymbose. The distorted setae clustered at the

top of the achene, and the highly cylindrical nectary are most like *M. grazielae* n. sp., but the two species differ in most other features, and they seem unlikely to be close relatives. The inflorescence of *M. inordinata* is unusual in its short pyramidally paniculate form with the apical parts maturing later than the lateral parts. Most Asteraceae are more obviously cymose in their maturation pattern.

MIKANIA MORII R. M. King & H. Robinson, sp. nov.

Plantae volubiles. Caules subtiliter rubescentes vel flavo-virides fistulosi teretes multo striati glabri vel persparse puberuli in nodis parum vel distincte stipuliformiter appendiculati. Folia opposita, petiolis ad 9 cm longis distincte anguste alatis; laminae triangulares ad 18 cm longae et 15 cm latae base late cordatae vel hastatae vel auriculatae ad medio in partibus trinervatis late acutae margine multo denticulatae vel crenulato-denticulatae apice breviter acutae vel anguste acuminatae supra minute puberulae subtus sparse minute glandulo-punctatae et in nervis et nervulis breviter pilosae. Inflorescentiae axillares vel in ramis lateralibus terminales thyrsosideo-paniculatae vel pyramidaliter paniculatae, ramulis puberulis vel tomentellis, ramulis ultimis ca. 1 mm longis. Capitula subcylindrica vel anguste campanulata plerumque 10-12 mm alta et ca. 3 mm lata; bractea subinvolucralis subherbacea elliptica ca. 5-7 mm longa extus glabra vel sparse minute puberula; bractee involucri chartaceae 7-9 mm longae et 1.5-2.5 mm latae apice obtusae vel subrotundatae dense minute puberulo-fimbriatae extus evanescentiter minute puberulae vel glabrae. Corollae albae vel albo-virides aliquantum salverformes ca. 6.5-7.0 mm longae extus glabrae, tubis cylindraceis 3.5-4.0 mm longis, faucibus breviter infundibularibus ca. 1 mm longis, lobis lanceolatis ca. 2 mm longis et ca. 0.7 mm latis, faucibus superioribus et lobis inferioribus intus distincte papillosis; filamenta in partibus inferioribus ca. 0.6 mm longa et 0.16-0.20 mm lata in partibus superioribus ca. 0.2 mm longa base ca. 0.2 mm lata; thecae pallide virides ca. 1.5 mm longae; appendices antherarum ovatae ca. 0.35 mm longae et 0.25 mm latae; nectarium cylindricum ca. 1.2 mm altum; scapi stylorum vix vel non incrassati; appendices stylorum attenuatae dense papillosae. Achaenia ca. 4.5 mm longa prismatica 5-costata persparse minute puberula in costis minute papillato-scabridula base sensim angustiora; carpodia cylindrica in sicco plicata; setae pappi ca. 70-75 ad 5 mm longae superne leniter clavatae, cellulis apicalibus densioribus obtusioribus. Grana pollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Bahia: Município de Maracás. Rod. BA 026, a 26 km ao SW de Maracás. Transição de Mata de Cipó para a Caatinga, muito perturbada por animais. Folha SD-24 (14-41b). Trepadeira. Flores esverdeadas. 27 Abril 1978. S. Mori, L.A. Mattos Silva, J.A. Kallunki & T.S. dos Santos 9995 (Holotype CEPEC, isotype US). PARATYPE: BRASIL: Bahia: Rod. R. Branca a Una.

Plantação de Cacau. Trepadeira sobre árvore fl. branca. 15.6.71. R.S. Pinheiro 1345 (US).

Mikania morii has long-petiolate broadly triangular-cordate leaves similar to those of *M. stipulacea* (Vahl) Willd. of the Rio de Janeiro area and *M. hemisphaerica* Sch.Bip. ex Baker from Pará and Minas Gerais southward into Argentina. All three species have laxly pyramidally paniculate inflorescences and share a high-cylindrical form of nectary. All three species have different forms of corolla, however. In *M. morii* the corolla is most salverform with the tapering lobes sharply spreading from a short throat. The lower inside surfaces of the lobes are strongly papillose. In *M. stipulacea* the corollas have erect more oblong lobes that are only about as long as the throat, and the inside surface of the lobes is nearly smooth. In *M. hemisphaerica*, which has the longest flowers, the corollas have a much longer tube, and the limb is shortly and broadly campanulate with triangular lobes about as long as wide. The inside surface of the limb is nearly smooth. The new species seems closest to *M. stipulacea*, but the nodes have broader flaps rather than the narrow stipuliform appendages seen in the latter species.

MIKANIA SANTOSII R. M. King & H. Robinson, sp. nov.

Plantae volubiles. Caules atro-brunnescentes late fistulosi teretes striati sparse pilosi. Folia opposita, petiolis ad 5 cm longis incrassatis; laminae coriaceae oblongo-ovatae ad 18 cm longae et 10.5 cm latae base leniter late cordatae margine remote crenato-serratae apice breviter late acuminatae supra glabrae subtus pilosae fere ad basem 5-7-palmato-nervatae, nervis et nervulis supra et praesertim subtus prominulis. Inflorescentiae axillares thyrsoido-paniculatae in ramis dense corymbosae, ramis dense pilosis, ramulis ultimis 0-1 mm longis pilosulis, bracteis primariis subfoliiformibus in laminis ovatis plerumque 2.0-3.5 cm longis et 0.9-1.5 cm latis, bracteis in ramulis valde minoribus linearibus vel subulatis ad 6 mm longis. Capitula plerumque in fasciculis tripliciter disposita anguste cylindrica ca. 8-9 mm alta; bractea subinvolucralis plerumque ad basem fasciculorum disposita subulata ca. 2 mm longa et ca. 0.8 mm lata margine minute puberulo-fimbriata; bractee involucri oblongae 4-5 mm longae et ca. 1.2 mm latae base carnosae subgibbosae apice rotundatae et dense puberulae margine anguste pallide scariosae extus plerumque glabrae. Corollae albae anguste infundibulares 5.5-6.0 mm longae, tubis cylindraceis 1.5 mm longis extus glabris, faucibus ca. 3.5 mm longis extus glabris intus superne in cellulis prominentibus, lobis oblongo-ovatis ca. 1 mm longis et 0.6 mm latis margine dense fimbriatis extus superne sparse puberulis; filamenta in partibus inferioribus 1.8-2.0 mm longa plerumque 0.15 mm lata in partibus superioribus ca. 0.45 mm longa et inferne 0.2 mm lata; thecae pallidae ca. 2 mm longae; appendices antherarum ovatae ca. 0.3 mm longae et 0.25 mm latae; nectarium breviter cylindricum ca. 0.3 mm altum; basi stylorum leniter

noduliferi; appendices stylorum superne vix vel non attenuatae dense patentiter anguste papillosae. Achaenia ca. 3 mm longa prismatica 5-costata inferne glabra superne sensim puberula, pilis in cellulis apicalibus interdum clavatis; setae pappi ca. 45 plerumque 4.5-5.0 mm longae longiores ad apicem leniter latiores, cellulis apicalibus obtusioribus. Grana pollinis ca. 20 μ m in diametro.

TYPE: BRASIL: Bahia: Rio Branco, estrada de Pratas.

Trepadeira sobre árvore, fl. branca, invóloco verde. Plantação de cacau. 27.1.71. *T.S.dos Santos 1438* (Holotype CEPEC, isotype US).

Mikania santosii is closely related to the more widespread species, *M. globosa* Spreng. and *M. hookeriana* DC., both of which occur in Bahia. The new species is easily distinguished by the larger oblong-ovate, crenate-serrate, pilose leaf blades. The lobes of the corolla also have a more prominent fringe of marginal hairs, and the papillae of the style branches are longer.

MIKANIA TEIXEIRAE R. M. King & H. Robinson, sp. nov.

Plantae herbaceae erectae ad 1 m altae non vel paucae ramosae. Caulis late fistulosi subhexagonales distincte striati glabri. Folia opposita superne interdum alterna sessilia vel subsessilia; laminae ellipticae 6-11 cm longae et 3-7 cm latae base rotundatae vel subcordatae margine integrae vel irregulariter sinuatae apice anguste rotundatae vel breviter obtusae supra et subtus glabrae subtus pallidiores fere ad basem quinquenervatae, nervis supra prominulis pallidis, nervis et nervulis subtus leniter prominulis, nervulis tertialibus subregulariter transversalibus. Inflorescentiae terminales pyramidaliter paniculatae inferne laxae ramosae distaliter dense subcorymbosae, ramis ultimis 0-7 mm longis puberulis, bracteis inferne paucae foliiformibus plerumque 1.5-3.0 cm longis, bracteis superioribus linearibus vel lanceolatis 4-8 mm longis. Capitula plerumque in fasciculis tripliciter laxae disposita anguste cylindrica ca. 8-9 mm alta; bractea subinvolucralis plerumque ad basem fascicularum binatae disposita lanceolata ad 3 mm longa margine puberula extus glabra; bractee involucricae oblongae ca. 5 mm longae et 1.5 mm latae base breviter subcarnosae apice rotundatae vel breviter obtusae glabrae. Corollae albae ca. 5.5 mm longae, tubis cylindraceutis ca. 1.8 mm longis extus persparse puberulis, faucibus abrupte leniter campanulatis ca. 2.2 mm longis extus sparse puberulis intus laevibus, lobis longe triangularibus ca. 1.3 mm longis et 0.8 mm latis margine dense puberulo-fimbriatis extus superne puberulis vel sparse pilosis; filamenta in partibus inferioribus ca. 1.5 mm longa et 0.14 mm lata in partibus superioribus ca. 0.4 mm longa et base 0.16 mm lata; thecae antherarum leniter fuscescentes ca. 1.2 mm longae; appendices antherarum oblongo-lanceolatae ca. 0.5 mm longae et 0.18 mm latae; nectarium cylindricum ca. 0.4 mm altum et 0.5 mm latum; scapi stylorum supra basem mediocriter incrassati; appendices stylorum fili-

formes dense breviter papillosae apice vix angustiores. Achaenia ca. 3 mm longa prismatica 5-costata sparse puberula inferne sensim angustiora, carpopodia discreta annuliformia; setae pappi ca. 32 plerumque 4.5-5.5 mm longae superne vix latiores, cellulis apicalibus acutis. Grana pollinis ca. 23 μ m in diametro.

TYPE: BRASIL: Distrito Federal: Chapada da Contagem, ca. 15 km NE of Brasília, steep campo slopes. Elev. 1100 m. Herb with ascending stems to 75 cm tall. Heads mostly in bud, white. 26 Oct. 1965. *H.S.Irwin, R.Souza, R.Reis dos Santos 9543* (Holotype US). PARATYPE: BRASIL: Distrito Federal: Corrego Covanças, near Chapada da Contagem, ca. 22 km NE of Brasília. Elev. 1000 m. Steep campo slopes. Herb ca. 1 m tall. Heads white. 11 Jan. 1966. *H.S.Irwin, R.Souza & R.Reis dos Santos 77572* (NY).

Mikania teixeirae is an erect herb, apparently related to *M. thapsoides* DC. The new species differs most notably by the entire sessile leaves, but also has smaller heads and prominently fringed corolla lobes.

The species is named for Dr. Alcides Teixeira of CNPq in Brasília, head of Programa Flora.

Literature Cited

Barroso, G. M. 1958. *Mikaniae do Brasil*. Arquivos do Jardim Botânico 15: 239-333, pl. 1-31, photo. 1-57.

Acknowledgement

We would like to thank the following people for their help in the study. Dr. Dourimar Nunes de Moura, Superintendent for International Cooperation, Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) Brasília, Dr. Paulo Alvim, Director of Research, and Dr. Scott A. Mori, Curator of the Herbarium, both of the Centro de Pesquisas do Cacau (CEPEC), Itabuna.



ASTERACEAE of BAHIA, BRAZIL

Mikania alvimii R. M. King & H. Robinson, Holotype, Jardim Botânico, Rio de Janeiro. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Mikania belemii R. M. King & H. Robinson, Holotype, Jardim Botânico, Rio de Janeiro.



ASTERACEAE of BAHIA, BRAZIL

Mikania grazielae R. M. King & H. Robinson, Holotype, Jardim Botânico, Rio de Janeiro.



ASTERACEAE of BAHIA, BRAZIL

Mikania hagei R. M. King & H. Robinson, Holotype, Jardim Botânico, Rio de Janeiro.



ASTERACEAE of BAHIA, BRAZIL

HERBARIUM

17251

R. M. King, N. C. S. M. & H. Robinson

Mikania inordinata R. M. King & H. Robinson, Holotype, Itabuna, Bahia, Brazil.

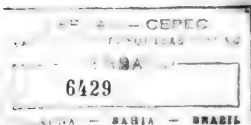
Mikania inordinata R. M. King & H. Robinson, Holotype,
Herbario Centro de Pesquisas do Cacau (CEPEC), Itabuna, Bahia.



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R. M. King - Junho 1979.
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Mikania morii R. M. King & H. Robinson, Holotype, Herbario Centro de Pesquisas do Cacau (CEPEC), Itabuna, Bahia.



HERBÁRIO CENTRO DE PESQUISAS DO CACAU

Mikania santosii R. M. King & H. Robinson, Holotype, Herbario Centro de Pesquisas do Cacau (CEPEC), Itabuna, Bahia.



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Mikania teixeirae R. M. King & H. Robinson, Holotype, United States National Herbarium.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CLXXXIX.

ADDITIONS TO ACRITOPAPPUS.

R. M. King and H. Robinson

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The genus Acritopappus represents one of the most easily distinguished elements in the tribe Eupatorieae with its combination of shrubby to arborescent habit, coriaceous to subcoriaceous leaves, defective pappus, and usually paleaceous non-conical receptacles. The flowers appear "pinkish" or "lilac" with the color concentrated in the anthers. The genus was established by King and Robinson in 1972 for three species from eastern Brazil, two of which had been placed variously in the genera Ageratum and Alomia. Two additional species were added five years later (King and Robinson, 1977), including one described as new. Recent study of material from Bahia and Minas Gerais has encountered six additional new species which are described in this paper, and twelve species are now recognized in the genus. A key to the species is presented at the end of the paper.

Acritopappus hagei R.M.King & H.Robinson, sp. nov.

Plantae fruticosae ad 3 m altae. Caules subhexagonales glabri, internodis ultimis non longioribus. Folia opposita, petiolis ca. 0.5-1.0 mm longis; laminae ovatae vel ovato-ellipticae plerumque 7-15 cm longae et 2.5-5.5 cm latae base obtuse cuneatae sensim breviter acuminatae margine serratae vel sub-integrae apice breviter acuminatae supra glabra in nervulis vix prominulis subtus subtomentosae in nervis et nervulis valde prominulis. Inflorescentiae terminales late cymosae vel sub-corymbosae, internodis inferioribus aliquantum elongatis, ramis suboppositis vel alternis ascendentibus, ramis ultimis 1-7 mm longis dense puberulis vel subtomentellis. Capitula campanulata 7-8 mm alta et 3-4 mm lata; squamae involucri ca. 25 subaequales anguste oblongae 3-4 mm longae et 1.0-1.3 mm latae plerumque 4-costatae margine anguste scariosae sparse fimbriatae apice breviter indurate acutae extus sparse puberulae vel subglabrae. Flores 25-30 in capitulo; corollae pallide lavandulae 3.5-4.0 mm longae sparse breviter stipitato-glanduliferae superne densius, lobis 0.5 mm longis et 0.4 mm latis in cellulis interioribus brevibus breviter papillois; thecae antherarum ca. 1.5 mm longae. Achaenia ca. 3 mm longa glabra; aristae pappi 4-5 ad 1.0 mm longae. Grana pollinis ca. 23 μ m in diam.

TYPE: BRAZIL: Bahia: Munic. de Mucugê, a 3 km ao S de Mucugê. Na estrada que vai par Jussiape. Elev. ca. 1000 m. Shrub 1 1/2 meters tall, flowers lavender. July 26, 1979. R.M.King, S.Mori,

T.S.dos Santos, J.Hage 8164 (Holotype, RB; Isotypes, CEPEC, US). PARATYPES: Same data as holotype, King et al. 8154, 8156 (CEPEC, US); Serra do Sitorã, 5 km south of Andaraí on road to Mucugê, by bridge over the Rio Paraguaçu. Very rocky hillside, with sandstone rocks, and rocky river with scrubby vegetation of small trees and shrubs. Alt. ca. 400 m, 41°19'W, 12°50'S. Shrub to 3 m. Leaves rather coriaceous, glossy dark green above grey green below. Phyllaries pale green. Corolla pale lilac-pink. 12.2.77. R.M.Harley, S.J.Mayo, R.M.Storr, T.S.dos Santos & R.S.Pinheiro 18573 (CEPEC, K, US).

Acrítopappus hagei is one of a series of species with short greyish tomentosity on the undersurface of the leaf. One other of the series, *A. subtomentosus* n. sp., has broad leaf blades, but details of the leaf base and involucre are different. In the present species the leaf bases are cuneate with a slight acumination rather than sharply rounded, and the leaf tips are comparatively short-acuminate. The involucre bracts of *A. hagei* are obtuse to short-acute and indurated as in the sympatric *A. confer-tum* (Gardn.) K. & R., while in *A. subtomentosus* the tips are rounded with a narrowly scarious margin as in *A. longifolius* (Gardn.) K. & R. with which it is sympatric in Minas Gerais. The corollas of *A. hagei* also seem to differ from those of *A. subtomentosus* by having shorter, more crowded, more bulging cells on the inner surfaces of the lobes. The achenes of *A. hagei* have distinct slender pappus aristae up to 1 mm long, while the achenes from *A. subtomentosus* have little or no pappus.

Acrítopappus morii R.M.King & H.Robinson, sp. nov.

Plantae fruticosae ad 2 m altae. Caules subhexagonales glabri, internodiis ultimis ad 35 cm longis. Folia opposita sessilia; laminae lineares vel peranguste ellipticae 5-50 cm longae et 0.8-3.3 cm latae base anguste subpetioliformes margine integrae apice anguste acutae supra glabrae subtus subtomentosae, nervis secundariis pinnatis brevibus, nervis et nervulis subtus valde prominentibus. Inflorescentiae elongate paniculatae in partibus secundariis plano-corymbosae; internodiis inferioribus elongatis, ramis primariis oppositis ascendentibus, ramis ultimis 0-2 m longis sparse puberulis. Capitula campanulata 6-7 mm alta et ca. 4 mm lata; squamae involucri 15-18 plerumque subaequales anguste oblongae vel lanceolatae 4-6 mm longae et ad 1 mm latae plerumque 4-costatae margine et apice anguste subscariosae sparse fimbriatae apice rotundatae extus glabrae. Flores saepe 20-25 in capitulo; corollae pallide lavandulae ca. 3.5 mm longae superne sparse breviter stipitato-glanduliferae, tubis 0.7-1.0 mm longis indistinctis, faucis ca. 2 mm longis, lobis ca. 0.6 mm longis et 0.5 mm latis; thecae antherarum distincte lavandulae ca. 1.2 mm longae. Achaenia ca. 2 mm longa glabra; pappus nullus. Grana pollinis 20-22 µm in diam.

TYPE: BRAZIL: Bahia: Munic. de Mucugê. Estrada que liga Mucugê cam Andaraí a 11 kms de primeiro. Elev. 1150 meters. July

27, 1979. R.M.King, S.Mori, T.S.dos Santos & J.Hage 8172 (Holotype, RB; Isotypes, CEPEC, US). PARATYPE: BRAZIL: Bahia: Serra do Sincorá. 22 km S. of Andaraí on road to Mucugê. Open area of peaty marsh. Wetter areas predominantly sedge, grasses and other Monocots, on white sand and peat with some small shrubs, with scattered rocky bluffs with scrub and small trees. Approx. 41° 20'W, 12°57'S. Alt. ca. 1000 m. Shrub to 2 m high with leaves up to ca. 50 cm and inflorescences on long stems. Corolla lilac. 16 Feb. 1977. R.M.Harley, S.J.Mayo, R.M.Storr, T.S.dos Santos & R.S.Pinheiro 18729 (CEPEC, K, US).

Acritopappus morii is thoroughly distinct in the narrow leaves which lack a well-defined petiole. The apices of the leaves are also distinctive in being narrow but not acuminate. The internodes of the inflorescence are longer than those seen in any other member of the genus, and they are responsible for the elongate form of the panicle. Some of the vegetative internodes are scarcely 2 cm long. The leaf undersurface has a pubescence and prominent venation as in A. micropappus and A. hagei.

Acritopappus prunifolius R.M.King & H.Robinson, sp. nov.

Plantae subarborescentes ca. 3 m altae multo ramosae. Caules hexagonales inferne sensim teretes inter costas dense puberuli, internodiis plerumque 1-2 cm longis. Folia opposita, petiolis ca. 4-5 mm longis; laminae ellipticae plerumque 2.5-3.5 cm longae et 1.2-1.7 cm latae base cuneatae et breviter acuminatae margine multo regulariter serrulatae apice obtusae interdum minute apiculatae supra et subtus glabrae, nervis distincte pinnatis, nervis et nervulis utrinque distincte prominulis. Inflorescentiae late corymbosae; ramis primariis oppositis erecto-patentibus dense puberulis, ramis ultimis nullis. Capitula anguste campanulata ca. 6 mm alta et 2 mm lata; squamae involucri ca. 7 anguste oblongae plerumque 5-6 mm longae et 1.0-1.5 mm latae 2-4-costatae margine anguste scariosae apice breviter acutae extus glabrae vel subglabrae; paleae subnullae. Flores ca. 5-6 in capitulo; corollae 3.0-3.5 mm longae extus multo sparse stipitato-glanduliferae, tubis ca. 1 mm longis, lobis ca. 0.6 mm longae et 0.5 mm latae; thecae antherarum ca. 1.2 mm longae. Achaenia 2.0-2.5 mm longa glabra; aristae pappi breves vel nullae ad 0.3 mm longae. Grana pollinis ca. 20 µm in diam.

TYPE: BRAZIL: Bahia: Serra do Tombador. ca. 7 km S. of town of Morro do Chapéu. Low woodland on middle slopes of Morro do Chapéu, elev. c. 1125 m. Brittle-stemmed treelet ca. 3 m X 2 m. 17 Feb. 1971. H.S.Irwin, R.M.Harley & G.L.Smith 32394 (Holotype, US).

The species is most distinct in the small elliptical and glabrous leaves. The closely congested heads, the more numerous glands on the corolla, and the blunt tips of the leaves all suggest closest relationship to A. micropappus and A. santosii, but the latter two differ by their more ovate leaves with pubescence and strongly prominent venation below, and by the long

lower internodes of the inflorescences.

Acritopappus santosii R.M.King & H.Robinson, sp. nov.

Plantae frutescentes ad 2.25 m altae mediocriter ramosae. Caules teretes striati superne subtomentosi, internodis plerumque 2-3 cm longis. Folia opposita, petiolis 2-4 mm longis; laminae late ovatae vel subdeltoideae 1.7-3.0 cm longae et 1.8-2.8 cm latae base truncatae margine multo dentatae apice obtusae et minute apiculatae supra glabrae et sparse minute glandulo-punctatae subtus subtomentosae fere ad basem trinervatae vel subtrinervatae, nervis et nervulis subtus valde prominentibus. Inflorescentiae cymosae vel subcorymbosae, internodis inferioribus elongatis, ramis primariis suboppositis vel alternis ascendentibus subtomentosis, ramis ultimis nullis. Capitula anguste campanulata 6-7 mm alta 2.0-2.5 mm lata; squamae involucri interiores ca. 5 plerumque subaequales oblongae vel anguste oblongae bi-costatae margine late scariosae fimbriatae saepe lacinatae apice obtusae vel minute apiculatae extus glanduliferae et sparse puberulae; squamae exteriores ca. 2 ca. 2-3 mm longae; paleae nullae vel subnullae. Flores ca. 5 in capitulo; corollae pallide lavandulae ca. 4 mm longae extus multo plerumque stipitate glanduliferae, tubis ca. 1 mm longis, lobis ca. 0.6 mm longis et latis; thecae antherarum distincte lavandulae ca. 1.5 mm longae. Achaenia ca. 3 mm longa glabra; pappus coroniformes ad 1 mm altus laciniatus. Grana pollinis 20-22 μ m in diam.

TYPE: BRAZIL: Bahia: Summit of Morro do Chapau, ca. 8 km SW of the town of Morro do Chapau to the west of the road to Utinga. Sandstone rocks, with open sand in flatter areas. Open scrub in exposed sites to scattered low woodland. Approx. 41°12'W, 11°35'S. Alt. ca. 1000 m. Shrub to 2.25 m. Leaves dull green above, paler beneath. Phyllaries grey-green. Florets lilac. 3 March 1977. R.M.Harley, S.J.Mayo, R.M.Storr, T.S.dos Santos & R.S. Pinheiro 19350 (Holotype, CEPEC; Isotypes K, US).

Acritopappus santosii is closely related to A. micropappus and the two have almost identical habits. Nevertheless, during a preliminary identification of the Harley collections, Charles Jeffrey segregated the material of the present species, evidently because of the very distinctive coroniform laciniately toothed pappus. The character by itself, though striking, might not justify a species rank, but the leaves seem consistently different in their truncate bases and trinervate venation. Four specimens and a type photograph of A. micropappus all show the bases of the leaf blades obtusely angled with the basal series of secondary veins parallel or subparallel with the margin.

The pappus of the new species is unique in Acritopappus, but it resembles that of Scherya which is also from Bahia. The latter genus differs from Acritopappus in more important features, however, such as its herbaceous habit and its linear leaves with longitudinally parallel venation.

Acritopappus subtomentosus R.M.King & H.Robinson, sp. nov.

Plantae frutescentes vel arborescentes ca. 4 m altae. Caul-es subhexagonales superne subtomentosi, internodis plerumque 1.5-4.0 cm longis. Folia opposita, petiolis 11-22 mm longis; laminae ovato-lanceolatae 7-13 cm longae et 2.0-3.7 cm latae base rotundatae vel breviter obtusae margine minute serrulatae apice anguste longe acuminatae supra minute puberulae vel sparse subtomentosae dense glanduliferae subtus subtomentosae in nervis et nervulis leniter prominulae, nervis secundariis distincte pinnatis interdum indistinctis. Inflorescentiae terminales corymbosae vel subcymosae, ramis primariis alternis ascendentibus, ramis ultimis 0-2 mm longis tomentosis. Capitula anguste campanulata ca. 6 mm alta et 2.5 mm lata; squamae involucri ca. 12 plerumque subaequal-es oblongae 3.0-3.5 mm longae et 0.8 mm latae valde bi-costatae margine et apice distincte anguste scariosae apice rotundatae extus superne puberulae. Flores ca. 15 in capitula; corollae pallide lavandulae? ca. 4 mm longae superne sparse breviter stipitato-glanduliferae, tubis ca. 1 mm longis, lobis 0.5 mm longis et 0.4 mm latis in cellulis interioribus elongatis sub-mammillosis; thecae antherarum distincte lavandulae 1.5 mm longae. Achaenia 2.0-2.2 mm longa glabra; aristae pappi nullae vel paucae ad 0.4 mm longae. Grana pollinis 20-22 μ m in diam.

TYPE: BRAZIL: Minas Gerais: Serra do Espinhaço. Campo on white sand and cerrado among outcrops, ca. 5 km N. of São João da Chapada, road to Inhaí. Elev. 1200 m. Outcrops. Shrub or small tree to ca. 4 m tall. Heads lavender. 28 March 1970. H.S.Irwin, S.F.da Fonseca, R.Souza, R.Reis dos Santos & J.Ramos 28506 (Holotype, UB; Isotypes NY, US).

The shape of the leaf and the rounded scarious tips of the involucre bracts in A. subtomentosus indicate relationship to A. longifolius, but the latter species has the leaves and involucre bracts glabrous. The involucre bracts of the new species are notable for their regularly oblong shape. In Bahia A. hagei and A. confertus represent a similar pubescent versus glabrous species pair.

Acritopappus teixeirae R.M.King & H.Robinson, sp. nov.

Plantae herbaceae perennes ad 2 m altae. Caul-es flavo-virides subteretes striati subglabrae vel obscure glanduliferae, internodis plerumque 2.5-4.0 mm longis. Folia opposita; laminae sessiles lanceolatae plerumque 8-16 cm longae et 1-2 cm latae base anguste cuneatae subpetioliformes margine serrulatae vel subintegrae apice breviter caudato-acuminatae supra et subtus glabrae vel subglabrae in nervis et nervulis prominentes, nervis secundariis pinnatis utrinque ca. 7 ascendentibus. Inflorescentiae laxae corymboso-paniculatae in ramis dense corymbosae, internodis inferioribus elongatis ad 13 cm longis, ramis primariis alternis minute puberulis et obscure glanduliferis, ramis ultimis 2-4 mm longis puberulis vel subtomentellis, bracteis subinvolucralibus paucis linearibus ad 3 mm longis. Capitula breviter

campanulata ca. 5 mm alta et 3-4 mm lata; squamae involucri ca. 16 anguste oblongae vel lanceolatae 2.5-3.0 mm longae et 0.5-1.0 mm latae extus plerumque valde bicostatae interiores margine distincte scariosae apice breviter acutae vel obtusae vel subtruncatae induratae. Flores ca. 18 in capitulo; corollae albae vel lavandulae vel azureae 2.0-2.3 mm longae tubiformes vel leniter infundibulares extus plerumque in tubis minute stipitato-glanduliferae, tubis ca. 0.5 mm longis, faucibus ca. 1 mm longis, lobis ca. 0.5 mm longis et 0.4 mm latis intus dense distincte mamillosis; filamenta tota 0.3 mm longa; thecae antherarum sordidae 0.8 mm longae. Achaenia ca. 1.8 mm longa glabra; pappus nullus. Grana pollinis ca. 22 μ m in diam.

TYPE: BRASIL: Bahia: Serra do Rio de Contas. Between 2.5 and 5 km S of the Vila do Rio de Contas on side road to W of the road to Livramento, leading to the Rio Brumado. Alt. ca. 980 m. Approx. 41°50'W, 13°36'S. Rocky riverside with rapids, riverine vegetation, cerrado with sandstone outcrops and some grassland areas subject to flooding but dry at time of collection. Large herb to 2 m, branching from base. Leaves mid-green, glossy beneath. Phyllaries pale green. Corolla white, anthers yellow, styles white. 28 March 1977. R.M.Harley, S.J.Mayo, R.M.Storr, T.S.Santos & R.S.Pinheiro 20075 (Holotype CEPEC; isotype US). PARATYPE: BRASIL: Bahia: Município de Livramento do Brumado. BA 156, entre Livramento do Brumado/Rio de Contas, a 5 km a NW do primeiro. Caatinga. Elev. 600 meters. Common shrubs to 1½ meters tall, flowers lavender or blue. July 19, 1979. R.M.King, S.Mori, T.S.Santos & J.Hage 8043 (CEPEC).

The corollas and anthers of *Acritopappus teixeirae* are shorter than those of other members of the genus, and they are scarcely exerted beyond the involucre bracts and paleae. The species has narrow leaves with little or no petiole and elongated lower nodes in the inflorescence, both characters shared with *A. morii*, but the latter is a large shrubby plant with tomentellous lower leaf surfaces and non-acuminate leaf tips.

The species is named for Dr. Alcides Teixeira of CNPq in Brasília, head of Programa Flora.

The following previously named species is also a member of the genus.

Acritopappus heterolepis (Baker) R.M.King & H.Robinson, comb. nov. *Ageratum heterolepis* Baker in Martius, Flora Brasiliensis 6 (2): 198. 1876.

Key to the species of *Acritopappus*

1. Leaves with broadly rounded sessile bases (Bahia)
 - A. harleyi K. & R.
1. Leaves with narrow or distinctly petiolate bases 2

2. Leaf tips obtuse to shortly acute 3
3. Leaves essentially glabrous, with shallowly prominulous veins, margins evenly serrulate, venation strictly pinnate (Bahia) A. prunifolius K.& R.
3. Leaves subtomentose below, pubescence nearly obscuring the areolae, venation of the undersurface very prominent, margins often rather coarsely dentate 4
4. Pappus of a few separate small aristae; leaf blades not truncate at base, veins slightly congested toward base of blade (Bahia) A. micropappus (Baker) K.& R.
4. Pappus a fused laciniate crown; leaf blades truncate at base, trinervate from near base (Bahia) A. santosii K.& R.
2. Leaf tips narrowly acute to narrowly acuminate 5
5. Undersurfaces of leaf blades and sometimes outer surfaces of involucre bracts distinctly puberulous to griseo-tomentellous 6
6. Leaves tapering to base without distinct petiole, leaf tips narrowly acute; inflorescence with long lower internodes (to 30 cm) (Bahia) A. morii K.& R.
6. Leaves with distinct petiole, petiole usually 7-30 mm long, leaf tips acuminate; inflorescence without extremely long lower internodes 7
7. Inflorescence with heads all on distinct peduncles up to 10 mm long, heads with ca. 35 flowers; leaf blades lanceolate with narrowly cuneate bases (Bahia) A. heterolepis (Baker) K.& R.
7. Inflorescence with heads usually congested on short peduncles, heads with 15-30 flowers; leaf blades ovate to ovate-lanceolate 8
8. Base of leaf blade cuneate to acuminate; involucre bracts short-acute with indurated tips; heads with 25-30 flowers (Bahia) A. hagei K.& R.
8. Base of leaf blade usually abruptly rounded; involucre bracts with rounded narrowly scarious tips; heads with ca. 15 flowers (Minas Gerais) A. subtomentosus K.& R.

5. Undersurfaces of leaf blades and involucre bracts essentially glabrous 9
9. Corollas 2.0-2.3 mm long; leaf blades mostly flat in pressed specimens, not conduplicate; inflorescence with lower internodes usually over 10 cm long (Bahia)
A. teixeirae K. & R.
9. Corollas 3.5-5.0 mm long; leaf blades usually distinctly arching and often conduplicate in pressed specimens; inflorescence with lower internodes usually less than 6 cm long 10
10. Heads with ca. 15 involucre bracts and 25-30 flowers (Minas Gerais) *A. irwinii* K. & R.
10. Heads with 6-10 involucre bracts and 6-15 flowers . . 11
11. Involucre bracts obtusely acute with indurated tips; leaf tips narrowly acuminate (Bahia, Ceará)
A. confertus (Gardn.) K. & R.
11. Involucre bracts with rounded or truncate narrowly scarious tips; leaf tips very long and filiform-acuminate (Minas Gerais)
A. longifolius (Gardn.) K. & R.

Literature Cited

- King, R. M. and H. Robinson 1972. Studies in the Eupatorieae (Asteraceae) CIX. A new genus, *Acritopappus*. *Phytologia* 24 (5): 401-403.
- _____ and _____. 1977. Studies in the Eupatorieae (Asteraceae). CLXVI. A new genus *Scherya* and additions to *Acritopappus*. *Phytologia* 38 (2): 99-105.

Acknowledgement

We would like to thank the following people for their help in the study. Dr. Dourimar Nunes de Moura, Superintendent for International Cooperation, Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) Brasília, Dr. Paulo Alvim, Director of Research, and Dr. Scott A. Mori, Curator of the Herbarium, both of the Centro de Pesquisas do Cacau (CEPEC), Itabuna.



ASTERACEAE - IBAMA, BRAZIL

Acritopappus hagei R. M. King & H. Robinson, Holotype,
Jardim Botânico, Rio de Janeiro. Photos by Victor E. Krantz,
Staff Photographer, National Museum of Natural History.



ASTERACEAE of BAHIA BRAZIL

Acrítopappus morii R. M. King & H. Robinson, Holotype,
Jardim Botânico, Rio de Janeiro.



MIN. L. STATES

2515494

NATIONAL HERBARIUM

Acritopappus prunifolius R. M. King & H. Robinson, Holotype,
United States National Herbarium.



2851615

NATIONAL HERBARIUM

Acrítopappus santosii R. M. King & H. Robinson, Isotype,
United States National Herbarium.



THE NEW YORK BOTANICAL GARDEN
Plants of the Flacalto do Brasil

Estado de Minas Gerais
Serra do Maricage

No. 28506

Shrub or small tree to ca. 1m tall. Heads
lavender. Outcrops. Campo on white sand and
cerrado among outcrops, ca. 5km N. of São
João da Chapada, road to Inhai. Elev. 1200m.

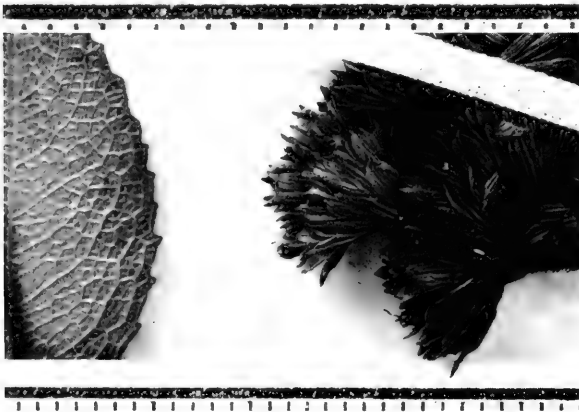
H. S. Irwin, S. F. da Fonseca,
R. Sousa, R. Reis dos Santos,
J. Raimo

40 March 1970

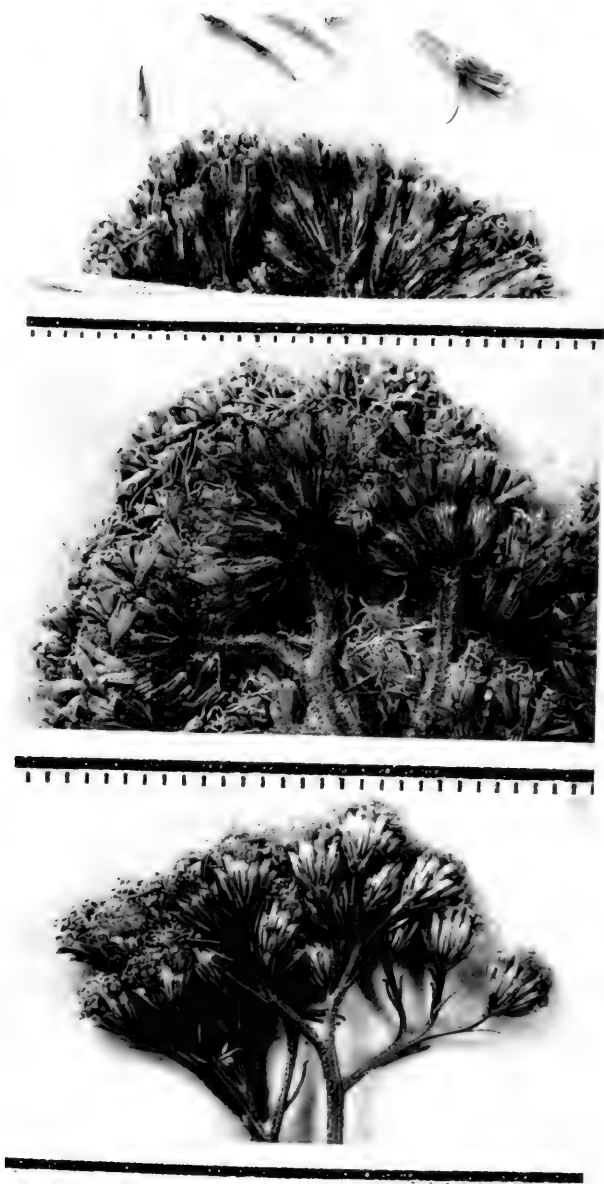
Field work conducted with the collaboration of the Universidade de Brasília and
the Instituto de Pesquisas e Experimentação Agrícola de Brasília supported in
part by funds from the National Science Foundation



Acritopappus subtomentosus R. M. King & H. Robinson,
Holotype, Herbario Universidade de Brasília.



Enlargements of heads of *Acritopappus*. Top. *A. hagei*.
Middle. *A. morii*. Bottom. *A. prunifolius*.



Enlargements of heads of *Aeritopappus*. Top. *A. cantosii*. Middle. *A. subtomentosus*. Bottom. *A. teixeirae*.

NEW SPECIES OF VERNONIEAE (ASTERACEAE). IV.

THREE ADDITIONS TO *VERNONIA* FROM ECUADOR AND PERU.

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Continuing efforts to determine Asteraceae from the Andean region of South America have revealed the following apparently undescribed species of *Vernonia* from Ecuador and Peru. The material reviewed also contained two collections from the Province of Sandia in Puno, Peru (Vargas 11825, 11856) that are superficially similar to various species of *Vernonia* subg. *Critoniopsis*. The two specimens prove to be the species named *Vanillosmopsis weberbaueri* Hieron. Closer examination shows a pappus of setae in more than one series without a distinct outer pappus. As such, the species is not reasonably included in *Vernonia*, but nevertheless, it will eventually probably have to be removed from the genus *Vanillosmopsis*, which is otherwise known only from Brasil, and which differs in pubescence-type and floral details.

The new species are as follows.

VERNONIA FERREYRAE H. Robinson, sp. nov.

Plantae fruticosae ca. 1 m altae multo ramosae. Caules teretes leniter striati dense pruinoso-puberuli, pilis T-formibus. Folia alterna, petiolis 2-3 mm longis; laminae ovatae vel anguste ovatae plerumque 1.5-3.5 cm longae et 0.8-1.5 cm latae base rotundatae vel breviter obtusae margine integrae vel subintegrae apice acutae vel breviter acutae supra leniter bullatae glabrescentes sensim lucidae glandulo-punctatae subtus dense pallide tomentosae, nervis subtus prominentibus, nervis secundariis utrinque ca. 4-5 ascendentiter arcuatis. Inflorescentiae in ramis terminales corymboso-paniculatae, ramis ascendentibus dense pallide tomentosis, ramulis in partibus sulcatis ultimis 1-12 mm longis, bracteis inferioribus et secundariis foliiformibus 0.6-1.2 cm longis et 0.3-0.6 cm latis, bracteis ultimis minutis subulatis. Capitula in ramulis subdense corymbosa late campanulata ca. 7 mm alta et ca. 5-8 mm lata; squamae involucri fulvescentes vel purpurascens ca. 38 ca. 5-seriatae erectae apice leniter recurvatae anguste ovatae 1.0-3.5 mm longae et 0.5-1.2 mm latae apice acutae minute apiculatae margine anguste scariosae saepe pallidae extus sparse evanescentiter tomentellae superne ad medio dense glandulo-punctatae longitudinaliter atro-viridescens iter vel atro-purpurascens iter univittatae. Flores ca. 25 in capitulo. Corollae lavandulae ca. 8 mm longae, tubis anguste cylindraceis ca. 4.0-4.5 mm longis extus sparse minute glandul-

iferis, faucibus leniter infundibularibus ca. 1 mm longis, lobis linearibus ca. 2.5-2.8 mm longis et 0.4 mm latis inferne sparse minute glanduliferis subapicem dense glandulo-punctatis et breviter contorte setiferis, setis uniseriatis in cellulis apicalibus ca. 0.15 mm longis; thecae antherarum 2 mm longae; appendices antherarum oblongo-ovatae ca. 0.5 mm longae et 0.2 mm latae apice obtusae extus glabrae; nodi stylorum annuliformes; scapi stylorum in partibus hispidulis superioribus subnulli; rami stylorum extus longe appresse argute sericeo-papilloso et multo glandulo-punctati, papillis in parietibus incrassatis. Achaenia 1.5-2.0 mm longa dense setifera; carpodia breviter cylindrica lateraliter dense glandulo-punctata; setae pappi ca. 35 ca. 4.5 mm longae superne sensim leniter latiores margine et extus scabridulae, squamae exteriores lanceolatae ca. 1 mm longae extus sublaeves. Grana pollinis in diametro ca. 45 μ m valde regulariter lophorata, cristis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. cognata* type).

TYPE: PERU: Cuzco: Prov. Anta. Wairronka? alt. 2000 m. 18 Dec. 1966. *C. Vargas C. 17905* (Holotype US). PARATYPES: PERU: Apurimac: Prov. Abancay. Just west of Río Apurimac near bridge over a small stream, km 84 east of Abancay. Alt. 2200 m. Shrub to 1 m tall; flowers purple. 3 Nov. 1957. *P.C. Hutchison 1748* (US); Cuzco: km 96-97 Highway Cuzco-Abancay, near Puente Cunyac. Habitat stony. Alt. 1900-2000 m. Flores white. Nov. 20, 1947. *Ramon Ferreyra 2744* (US); Puente de Cunyac. Flores azules. 8/7 1948. *Velarde 1390* (US).

Vernonia ferreyrae seems closest to *V. mandonii* Sch.Bip. ex Gleason of Bolivia, but the latter has broader leaves with more numerous more insculptate secondary veins, has somewhat larger heads sessile in pairs or small clusters, and has attenuate tips on the involucre bracts. *Vernonia mandonii* has pollen reticulation of the *V. cognata* type with a polar areole and two series of intercolpar areoles as in *V. ferreyrae*, but the Bolivian species lacks the glands on the upper surfaces of the carpodium.

VERNONIA RETROSETOSA H. Robinson, sp. nov.

Plantae frutescentes vel subscandentes mediocriter ramosae. Caules virides vel brunnescentes teretes irregulariter leniter striati dense longe subretrorse flavo-pilosi. Folia alterna, petiolis distinctis brevibus ca. 3-5 mm longis dense sericeo-pilosis; laminae ovatae plerumque 5-7 cm longae et 2.5-3.3 cm latae base rotundatae margine utrinque remote 5-7-mucronato-serrulatae apice breviter argute acuminatae supra et subtus longe sericeo-pilosae non glandulo-punctatae in nervis et nervulis prominulae in nervis primariis inferne dense retrorse sericeo-pilosae, nervis secundariis utrinque plerumque 4-5 patentibus arcuatis sensim ascendentibus. Inflorescentiae paucae ramosae, ramis in nodis distincte leniter deflectitis dense subretrorse flavo-sericeo-pilosis, bracteis foliiformibus plerumque 1.5-5.5 cm longis et 0.6-2.2 cm latis. Capitula remota uniseriata

sessilia axillaris late campanulata ca. 10 mm alta et 7 mm lata; squamae involucri exteriores virides ca. 30-35 multiseriatae distincte patentibus aristiformes 5-9 mm longae sparse sericeo-pilosae superne extus pallide uni-costatae, squamae interiores ca. 12 anguste lanceolatae ca. 7.5 mm longae inferne pallidae ca. 1.3 mm latae apice anguste acutae extus superne viridescentes et sericeo-pilosae. Flores ca. 25 in capitulo. Corollae albae? ca. 8 mm longae, tubis perangustatis ca. 5 mm longis extus glabris, faucibus subnullis ca. 0.1 mm longis, lobis linearibus ca. 3.5 mm longis et 0.6 mm latis inferne glabris ad apicem dense stipitato-glanduliferis et paucae spiculiferis; thecae antherarum ca. 2 mm longae; appendices antherarum anguste ovatae ca. 0.35 mm longae et 0.17 mm latae glabrae; nodi stylorum annuliformes; scapi stylorum in partibus hispidulis superioribus ca. 0.4 mm longi. Achaenia ca. 1.5 mm longa dense setifera; carpodia rotundato-obturaculiformia in superficie superiore setifera; setae pappi subsistentes ca. 55-60 ca. 5 mm longae superne sensim latiores margine et extus scabridulae, squamae exteriores oblongo-lanceolatae ca. 0.8 mm longae extus plerumque laeves. Grana pollinis in diametro ca. 50 μ m valde lophorata, cristis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. geminata* type).

TYPE: PERU: Puno: Prov. Sandia, bajando de Valle Grande. Habitat bosque ralo. Alt. 2000 m. 7 Agosto 1957. C. Vargas C. 11844 (Holotype US).

Vernonia retrosetosa is named after the distinctive form of pubescence on the stems. The stiff yellowish hairs are directed backward and curve outward, forming a brush around the slender stems. The pollen of the new species has colpi areoles which touch at the poles and has two intercolpar rows, a condition seen in *V. geminata* Less. and its close relatives in Brasil.

VERNONIA VIOLICEPS H. Robinson, sp. nov.

Plantae fruticosae vel subscandentes ad 2 m altae. Caules teretes leniter striati dense sordide velutini. Folia alterna, petiolis 5-7 mm longis; laminae ovato-lanceolatae plerumque 9-12 cm longae et 3.0-4.5 cm latae base rotundatae vel obtusae margine integrae vel subintegrae anguste recurvatae apice breviter argute acuminatae supra persparse strigulosae in nervis primariis prominentes pilosae in nervis secundariis prominulae subtus appresse sericeo-puberulae in nervis et nervulis prominulae, nervis secundariis utrinque ca. 7 ascendentiter arcuatis. Inflorescentiae in ramis terminales multo ramosae, ramis dense sordido-velutinis, bracteis inferioribus paucis foliiformibus plerumque 3.0-4.5 cm longis et 1.0-1.5 cm latis, bracteis superioribus et ramulosis minoribus plerumque ca. 1 cm longis et ad 0.4 cm latis facile deciduis, ramulis interdum in nodis leniter deflectis. Capitula in seriebus solitaria vel geminata sessilia ad 12 mm alta et plerumque 3-4 mm lata; squamae involucri exteriores lavandulae ca. 30-35 ca. 4-seriatae erecto-

patentes vel subappresse anguste lanceolatae pungentes 1.5-5.5 mm longae et ca. 0.5-1.0 mm latae margine sparse pilosae extus albo-sericeae, squamae interiores ca. 9 oblongo-lanceolatae superne late scariosae apice breviter abrupte acuminatae extus praeter marginem albo-sericeae. Flores 10-12 in capitulo. Corollae lavandulae ca. 7.5 mm longae, tubis anguste infundibularibus ca. 4 mm longis extus glabris, faucibus ad 1.5 mm longis infundibularibus glabris, lobis lanceolatis 2.0-2.3 mm longis inferne 0.5 mm latis extus superne dense setiferis; thecae antherarum ca. 2 mm longae; appendices antherarum anguste ovatae ca. 0.5 mm longae et 0.2 mm latae glabrae apice subacutae crenulatae; nodi stylorum annuliformes; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longi. Achaenia ad 2.2 mm longa dense setifera; carpodia rotundato-obturaculiformia in superficie superiore setifera; setae pappi subpersistentes ca. 45 plerumque ca. 5 mm longae superne sensim latiores margine et extus scabridulae, squamae exteriores lanceolatae plerumque 1.0-1.3 mm longae extus laeves. Grana pollinis leniter oblata ca. 45 μ m alta et 50 μ m lata valde lophorata, cristis minute spinuliferis, spinis majoribus nullis (reticulation with 1-3 polar areoles and 3 rows of intercolpar areoles).

TYPE: ECUADOR: Tungurahua: along the road to Puyo, ca. 2 kms E of Río Negro. Elev. ca. 4300 ft. Several plants, ca. 2 meters tall, shaded areas, phyllaries lavender. Jan. 21, 1974. *R.M. King* 6558 (Holotype US). PARATYPE: ECUADOR: Tungurahua: Road Baños-Mera, 35 km from Baños. Clearing and rain forest along line from Television Plant to antenna (along Río Cashaurco). Alt. 1450-1550 m. (78 10'W 1 25'S). Scandent shrub. Flowers violet. Sep. 4, 1976. *B. Øllgaard & H. Balslev* 9301 (US).

In general aspect and number of flowers in the heads, the new species seems closest to *V. ehretiaefolia* Benth. of Venezuela, Guiana and northern Brasil, and *V. sclareaefolia* Sch.Bip. of Colombia. The first of these is closer in leaf texture and blade pubescence and in its differentiated outer involucre, but it has more elliptical leaves with narrower bases and has more crowded heads on less deflected branches of the inflorescence. The Colombian species has larger heads without differentiated outer bracts, and has leaves with more roughened upper surfaces, densely tomentellous undersurfaces, and acute bases of the blade. Both specimens of the new species have violet involucral bracts, a feature not seen in the related species.



HERBARIO VARGAS. CUZCO, PERU
PLANTAE PERUVIANAE

Vernonia ferreyrae H. Robinson Holotype
C. VARGAS C. 17905 18 de Octubre 1966

Dpto. Cuzco Prov. Bca. Julia

Elevación exacta 2400 m.

Abund. 2000

Desem. 10

Arbusto, herbáceo

UNITED STATES
2575402 A

NATIONAL HERBARIUM

Vernonia ferreyrae H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



HERBARIUM VARGAS, CUSCO, PERU
PLANTAE PERUVIANAE

Vernonia retrosetosa (H. Robinson) Robinson

2575403 A

NATIONAL HERBARIUM

2575403 A

NATIONAL HERBARIUM

Vernonia retrosetosa H. Robinson, Holotype, United States National Herbarium.



UNITED STATES

2733085

NATIONAL HERBARIUM

Vernonia violiceps H. Robinson, Holotype, United States
National Herbarium.



Vernonia enlargements of heads. Top. *V. ferreyrae*. Middle. *V. retrosetosa*. Bottom. *V. violiceps*.

NEW SPECIES OF VERNONIEAE (ASTERACEAE). V.

ADDITIONS TO *VERNONIA* FROM BRASIL.

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A collection containing many undetermined specimens of *Vernonia* from Brasil was sent some years ago by the New York Botanical Garden, and more recently material from the State of Bahia has been made available through the aid of Scott Mori at Itabuna in Bahia and Charles Jeffrey at Kew. In the last year still more material of *Vernonia* from Bahia has been collected by R. M. King. Since names are needed for some chemical and cytological vouchers in the last collections, and since the U. S. National Herbarium has a rather complete representation of Brazilian species of *Vernonia*, a simultaneous effort has been made to determine the material of all the recent collections. As a result, the present paper adds 17 species to the more than 200 already described from Brasil. These new species cannot be matched with specimens, type photographs, or descriptions of previously known species. It should be noted that older undetermined material remains unworked, although searches have been made for earlier collections of the new species described here. The present effort has remained primarily one of identification, and careful monographic review is greatly needed.

Five species from Bahia have been described in a recent paper (Robinson, 1979), and two of these are now seen to need revision. *Vernonia matts-silvae* H. Robins. is the same as *V. lanuginosa* Gardn. which I would resurrect from the synonymy of *V. scorpioides* var. *sororia* Baker. For reasons of pollen structure detailed below, combined with other characters given in the previous paper, it seems best to transfer *Vernonia nobilis* to the genus *Mattfeldanthus* H. Robins. & R. M. King. The combination is as follows:

MATTFELDANTHUS NOBILIS (H. Robins.) H. Robins., comb. nov. *Vernonia nobilis* H. Robins., Phytologia 44 (4): 291. 1979.

In discussions below of relationships of new species, a prime consideration has been the form of the pollen. Differences in pollen in the Vernonieae have been noted by many workers, including Stix (1960), Keeley and Jones (1977), and Jones (1979), and some consistency is evident within related groups. The terminology of Stix is given precedence here. Some comparisons are offered with other characters and with the mostly artificial

al Sections and subseries of Baker (1873).

The most distinctive pollen type in the genus is the *Lychnophora*-Type of Stix (Type A of Keeley & Jones, 1977, and Jones, 1979). This has irregular and comparatively low, thickened or crested areas on the surface of the pollen. The diameter is ca. 40 μm . The Type is found in *V. noveboracensis* (L.) Michx., the type species of the genus from eastern North America. In Tropical America the Type occurs in various species of the section *Critoniopsis*, and in the parts of Baker's *Lepidaploae* *Scorpioidae* which contains *V. scorpioides* Pers., *V. brasiliana* (L.) Druce, *V. patens* H.B.K. and *V. polyanthes* (Spreng.) Less. The Type has already been noted as occurring in *V. harleyi* H.Robins. and *V. lanuginosa* Gardn. (Robinson, 1979), and it occurs in *V. piresii* n.sp., all of which are close relatives of *V. scorpioides*. The Type also occurs in *V. angulata* n.sp., which has a thyrsoid panicle, and which seems to fall in the *Lepidaploae* *Paniculatae* of Baker. The two new species with the pollen type also share a type of anther appendage showing minute spicules but no glands on the outer surface, but such spicules are not present in some of the related species.

The majority of Brazilian species have pollen grains of larger size with high crests forming distinct lophorate patterns. Different lophorate patterns were distinguished first by Stix (1960), and these, plus one other type distinguished here, seem to be of some taxonomic use.

The most common lophorate form of pollen is the *V. argyrophylla*-Type of Stix (Type B of Jones, 1979), having the three colpar areolae meeting at the poles and having three rows of areolae across the intercolpar region. Species with this type include, *V. morii* H.Robins., from the previous paper, as well as *V. caiapoensis*, *V. cristalinae*, *V. fonscae*, *V. grearii*, *V. pseudopiptocarpha*, *V. soderstromii*, *V. souzai* and *V. subcarduoides* described below. These species have characters of the various series *Axilliflorae*, *Macrocephalae* and *Oligocephalae* of the Section *Lepidaploae* of Baker (1873).

A minor variant of the *V. argyrophylla*-Type has partial or complete additional partitions across the colpar region above and below the pores. Species involved include *V. regis* n.sp. having the characters of Section *Stenocephalum*, and the singularly distinctive scapose *V. santosii* n.sp., with its few large heads having the peripheral flowers maturing precociously as a group before the central corollas emerge from the pappus.

The previous subtype approaches the *V. arenaria*-Type of Stix (Type D of Jones, 1979), which has cross-walls above and below the pores, but which has only two series of intercolpar areolae. The Type occurs in *V. pinheiroi* and *V. tombadorensis*, described below, both of which seem to belong in a natural group with *V. arenaria* Mart. marked by variously T-shaped hairs on the vegetative parts of the plants. The pollen Type also is seen in *V. echinocephala* n.sp. which resembles *V. holosericea*

and its relatives in the Lepidaploae Paniculatae of Baker (1873) in its great number of spreading spine-like involucre bracts.

Another pollen variation is termed here the *V. geminata*-Type. The three colpar areolae are continuous and meet at the poles as in the *V. argyrophylla*-Type, but there are only two series of intercolpar areolae. The Type is found in *V. persericea* H. Robins. from the previous paper, as well as *V. alvimii* and *V. hagei*, described below, all from Bahia. All are related to *V. geminata* Less., described from near Rio de Janeiro. The group is notable for including obviously related species, some of which have large inflorescence bracts and would fall in the Axilliflorae series of Baker, while *V. coultonii* Sch. Bip. ex Baker and *V. geminata* have minute inflorescence bracts and have been placed in the Scorpioides series by Baker. The *V. geminata*-Type pollen also occurs in the genus *Mattfeldanthus*, and its occurrence in *Vernonia nobilis* is one of the reasons that species is transferred here. The genus *Mattfeldanthus* can be characterized by the *V. geminata*-Type pollen, the pluri-axillary branching of the inflorescence, the unequal lobing of the corollas, and the more completely lignified tips of the corolla lobes.

The distinctive *V. cognata*-Type pollen of Stix (Type C of Jones, 1979) has a separate polar areole, lacks cross-walls above and below the pores in the colpar region, and has only two rows of intercolpar areolae. Stix reported the Type from four species, but none of these or any of the natural group related to *V. cognata* Less. have been examined in this study. The Type does not occur in any of the new species, but it has been seen in *V. lilacina* Mart. of Bahia and Minas Gerais, a species that otherwise resembles the *V. geminata* group.

The 17 new species are as follows.

VERNONIA ALVIMII H. Robinson, sp. nov.

Plantae suffruticosae ca. 1 m altae mediocriter ramosae. Caules teretes striati evanescentiter laxe strigosi vel subsericei. Folia alterna, petiolis ca. 2-4 mm longis; laminae ellipticae vel oblongo-ellipticae plerumque 3-6 cm longae et 1.2-2.2 mm latae base anguste rotundatae margine anguste recurvatae obscure remote subserrulatae apice argute acutae vel vix acuminatae supra strigosae vel subsericeae subtus dense sericeae et sparse glandulo-punctatae, nervis secundariis utrinque ca. 5-6 ascendentibus. Inflorescentiae plerumque axillares multo ramosae, ramis serialiter cymosis in nodis vix vel non deflectis laxe strigosis vel subsericeis, bracteis plerumque minutis vel nullis. Capitula in seriebus solitaria vel geminata sessilia ca. 8 mm alta et 4-6 mm lata; squamae involucri ca. 28-30 subimbricatae ca. 4-5-seriatae appressae lanceolatae vel oblongo-lanceolatae 1-5 mm longae et 0.4-1.2 mm latae apice acutae vix pungentes margine albo-scariosae ad medio viridi-vittatae extus laxe villosae. Flores 12-15 in capitulo. Corollae albae? in textura

tenuis 4.5-5.0 mm longae, tubis ca. 2 mm longis extus plerumque glabris superne latioribus et sparse minute glanduliferis, faucibus ca. 0.5 mm longis, lobis linearibus ca. 2.8 mm longis et 0.4 mm latis extus plerumque glabris ad apicem dense glandulo-punctatis et pauca spiculiferis; thecae antherarum ca. 1.7 mm longae base in partibus breviter caudatae; appendices antherarum ovatae ca. 0.5 mm longae et 0.23 mm latae apice acutae extus multo glanduliferae; scapi stylorum in partibus hispidulis superioribus ca. 0.2 mm longi; rami stylorum extus sparse glanduliferi. Achaenia ca. 2 mm longa ubique patentiter setifera et multo prominentiter punctata, punctis superficialibus 1-3-cellulatis subglanduliformibus; setae pappi persistentes ca. 37 plerumque 4.0-4.5 mm longae apice non latiores margine et extus scabridulae, squamae exteriores oblongo-lanceolatae vel lineari-lanceolatae 0.6-1.0 mm longae et 0.06-0.15 mm latae apice irregulares extus sparse scabridulae. Grana pollinis in diametro ca. 40 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. geminata*-Type).

TYPE: BRASIL: Bahia: Município de Santa Cruz de Cabrália a 5 km a W de Santa Cruz de Cabrália. Restinga. Elev. ca. 50 meters. Common, one meter tall, flowers white. July 6, 1979. *R.M. King, Scott Mori, A.M. de Carvalho & A. Eupônio 7991* (Holotype, RB; isotypes, CEPEC, US).

The species is named for Dr. Paulo Alvim, Director of Research, at the Centro de Pesquisas do Cacau, Itabuna, Bahia.

Vernonia alvimii is related to *V. geminata*, with which it shares the same pollen type, the same kind of 1-3-celled punctations on the achene surface, glands on the anther appendages and style branches, and the minute bracts subtending the heads. The new species differs most obviously by the lack of long sharply pointed reflexed tips on the involucre bracts, and the heads have significantly fewer bracts and flowers, ca. 40 and 12-15, versus ca. 50 bracts and ca. 25 flowers in *V. geminata*. The leaves are also less densely glandular-punctate below and have appressed rather than spreading pubescence. The recently described *V. persericea* H. Robins. is also evidently closely related, but differs by the densely sericeous pubescence, the lack of gemmiform bulging punctations formed of idioblasts on the achene surface, and the lack of glands on almost all parts. Authentic material of the related *V. coultonii* has not been seen, but the description and a type-photograph indicate the leaves are broader with cordate to subcordate bases and subglabrous surfaces, and that there are only 15-20 flowers in the heads.

The pollen of the new species seems to be of the *V. geminata*-Type, but the type specimen was over-aged and infested with gall-insects, and only one grain has been seen with any clarity. The galls are of a type also seen commonly in *V. geminata*.

The bulging gemmiform punctations on the surface of the achenes consisting of 1-3 rather thick-walled cells, seem to be idioblasts of some sort, each cell containing a large central

body that seems to be a crystal.

The habitat of the new species is in the restinga, while the label data indicates the related *V. geminata* is a plant of forest edges. The latter species is not presently known to occur north of the southern part of Minas Gerais and Espírito Santo.

VERNONIA ANGULATA H. Robinson, sp. nov.

Plantae suffruticosae vel fruticosae erectae ca. 1 m altae non vel pauca ramosae. Caules fulvescentes distincte 5-7-angulati puberuli vel minute pilosi. Folia alterna sessilia vel subsessilia, petiolis ad 2 mm longis; laminae oblongae vel oblongo-ovatae plerumque 3.0-5.5 cm longae vel 2.0-3.5 mm latae base rotundatae vel breviter obtusae margine distincte multo serrulatae apice breviter obtusae supra puberulae subtus dense glandulo-punctatae et in nervis et nervulis puberulae. Inflorescentiae terminales thyrsoidae-paniculatae in ramis subcymosis, ramis distincte angulatis dense puberulis, ramis ultimis in capitulis primariis subnullis in capitulis ultimis ad 16 mm longis, bracteis primariis foliiformibus ad 3 cm longis et 2 cm latis, bracteis ramorum minutis. Capitula late campanulata ad 9 mm alta et 14 mm lata; squamae involucri fulvescentes ca. 45-50 subimbricatae ca. 5-seriatae, exteriores valde recurvatae lanceolatae 4-6 mm longae 1.3-1.5 mm latae apice breviter pungentes margine dense longe fimbriatae, interiores erectae 6-7 mm longae apice acutae margine minute fimbriatae, omnes extus sparse puberulae et superne dense glandulo-punctatae; receptacula leniter convexa hispidula. Flores ca. 50 in capitulo. Corollae albae 6.5-7.0 mm longae extus glabrae, tubis anguste infundibularibus ca. 3 mm longis, faucibus infundibularibus ca. 1.5 mm longis, lobis lineari-lanceolatis ca. 3 mm longis et ca. 0.6 mm latis; thecae antherarum ca. 2.5 mm longae; appendices antherarum anguste ovatae ca. 0.7 mm longae et 0.23 mm latae apice acutae extus inferne pauca minute spiculiferae; nodi stylorum late disciformes margine subtiliter crenulati; scapi stylorum in partibus hispidulis superioribus subnulli. Achaenia ca. 1.5 mm longa in costis dense breviter hispidulo-setifera inter costas dense pustulifera, pustulis 1-3-cellularis; setae pappi albae ca. 35 plerumque ca. 5.5 mm longae superne sensim latiores margine et extus dense scabridulae, series exteriores setiformes ca. 0.5 mm longae dense scabridulae. Grana pollinis in diametro ca. 40 μ m irregulariter areolata et spinulosa (*Lychnophora*-Type).

TYPE: BRASIL: Goiás: Serra do Caiapó, ca. 40 km S of Caiapônia, road to Jataí, wet slope. Elev. 950 m. Subshrub ca. 1 m tall. 26 June 1966. *H.S. Irwin, R. Souza, J.W. Grear, R. Reis dos Santos 17793* (Holotype, US). PARATYPES: BRASIL: Goiás: Serra do Caiapó, ca. 25 km (straight line) SW of Caiapônia; elev. 800 m; gallery forest, adjacent brejo, and nearly cerrado and campo limpo. Herb 1.5 m tall; heads white; brejo. 1 May 1973. *W.R. Anderson 9593* (US); Município Jataí, loc. Queixada. Arbusto da vargeur, (fl.) brancas e lilajes. 8-VII-1949. *A. Macedo 1904*

(US); Municipio Jataí, loc. Balsano. Arbusto da vargeur, (fl.) brancas. 18-VII-1951. *A. Macedo 3316* (US).

Material of the new species has been labelled previously as *V. scabra* Pers., which equals *V. brasiliensis*, and the two species are undoubtedly related. The relationship does not seem to be immediate, however, and even the leaves, which are similarly obtusely pointed, have a basically different shape, being mostly obovate in *V. brasiliensis*. The form of the inflorescence is denser in *V. angulata*, and it is more closely matched by that of *V. griseola* Baker ex Warming. The new species is distinguishable from all of the most likely relatives by the narrow recurved tips on the involucre bracts. The stems of the new species also tend to be more sharply angled.

VERNONIA CAIAPOENSIS H. Robinson, sp. nov.

Plantae herbaceae; rhizomata horizontalia breviter. Caules primarii erecti interdum aggregati in partibus inferioribus non ramosi ad 40 cm alti flavescentes subpentagonales et paucè striati sparse puberuli. Folia alterna sessilia linearia plerumque 3-8 cm longa et 0.30-0.35 cm lata margine integra apice anguste acuta et minute apiculata supra et subtus glabra vel sparse minute puberula subtus sparse minute et indistincte glandulo-punctata, nervis secundariis brevibus tenuibus prominulis, nervis marginalibus valde distinctis. Inflorescentiae laxae cymosae pauci-capitatae, bracteis foliiformibus, pedunculis elongatis ad 8 cm longis superne leniter latioribus et densius puberulis. Capitula late campanulata ad 17 mm alta et 12-17 mm lata; squamae involucri subcoriaceae ca. 35-45 subimbricatae 4-5-seriatae erecto-patentes plerumque lanceolatae 1.5-12.0 mm longae et 0.8-1.8 mm latae apice pungentes margine anguste scariosae in partibus laxè longe fimbriatae extus puberulae vel sparse arachnoideo-pilosae superne fulvescentes vel purpureo-tinctae. Flores ca. 20 in capitulo. Corollae lavandulae 13-14 mm longae, tubis 7-8 mm longis infundibularibus extus glabris, faucibus ca. 1.5 mm longis, lobis linearibus 4.5-5.0 mm longis et 0.6 mm latis plerumque glabris fere ad apicem paucè piliferis et minute glanduliferis; thecae antherarum ca. 4 mm longae; appendices antherarum ovato-lanceolatae ca. 0.7 mm longae et ca. 0.2 mm latae apice breviter acutae extus glabrae; basi stylorum non abrupte noduliferi; scapi stylorum in partibus superioribus hispidulis ca. 1.3 mm longi. Achaenia submatura ca. 2.5 mm longa inter costas perdense setifera; setae pappi ca. 40 plerumque 7.0-8.5 mm longae superne non latiores plerumque in marginis dense scabridulae; squamae exteriores anguste lineares ca. 1 mm longae extus sparse minute spiculiferae. Grana pollinis aliquantum oblata ca. 45 μ m alta et 55 μ m lata valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Goiás: Serra do Caiapó, 17°12'S, 51°47'W. 60 km S of Caiapônia on road to Jataí. Elev. 800-1000 m. Burned-over cerrado. Stems mostly solitary, to 40 cm tall. Heads

magenta. Oct. 29, 1964. *H.S. Irwin & T.R. Soderstrom 7518* (Holotype, US).

Vernonia caiapoensis has narrow essentially glabrous leaves and sparsely branched inflorescences with long-pedunculate heads as seen in the related *V. grandiflora* Less. and *V. sessilifolia* Less. The new species differs from both by the generally smaller size, by the narrowly pointed involucre bracts, and by the weak spreading secondary veins of the leaf that end in a strong marginal vein. The related species have more prominent ascending secondary veins, and they lack a well-developed continuous marginal vein.

VERNONIA CRISTALINAE H. Robinson, sp. nov.

Plantae herbaceae perennes erectae ad 50 cm altae non ramosae. Caulis leniter pentagonales dense sordide tomentosi. Folia alterna sessilia elliptica vel obovata vel leniter oblanceolata inferne ad 3.5-6.5 cm longa et 1.5 cm lata superne descrescentia base cuneata vel interdum leniter constricta margine integra vel superne paucis subcrenulata apice obtusa vel breviter acuta supra tenuiter sericea glabrescentia subtus dense sordide tomentosa, nervis secundariis utrinque 3-5 valde ascendentibus. Inflorescentiae terminales 1-2-capitatae, bracteis subinvolucralibus capitulis saepe proximis foliiformibus oblongis plerumque 9-15 mm longis et 4-5 mm latis. Capitula late campanulata; involucre 10-15 mm alta et 10-20 mm lata; squamae involucri purpureo-tinctae vel atro-purpureae 70-100 subimbricatae 4-6-seriatae subappressae exteriores apice leniter patentes lanceolatae 3-13 mm longae et 1-2 mm latae apice acutae praeter interiores breviter pungentes margine plerumque pallidiores induratae dense puberulo-fimbriatae extus plus minusve tomentosae ad medio distincte uni-costatae. Flores ca. 35-45 in capitulo. Corollae lavandulae 13-14 mm longae, tubis anguste infundibularibus ca. 7 mm longis ad medio persparse minute glanduliferis, faucibus 1.5-2.0 mm longis glabris, lobis linearibus 4.5-5.0 mm longis ca. 0.7 mm latis subapice dense minute spiculiferis margine paucis tenuiter piliferis; thecae antherarum ca. 3 mm longae; appendices antherarum anguste ovatae ca. 0.7 mm longae et 0.23 mm latae apice anguste rotundatae extus glabrae; basi stylorum non vel vix noduliferi, scapi stylorum in partibus superioribus sparse hispidulis 0.5-1.0 mm longi. Achaenia ca. 3 mm longa inter costas dense longe lanatosetifera; setae pappi 35-40 plerumque 6-7 mm longae superne distincte clavatae inferne plerumque in marginis scabridulae apice margine et extus dense scabridulae, scabridulis distincte apiculatis; series exteriores setiformes vel anguste squamiformes ca. 1 mm longae extus sublaeves. Grana pollinis leniter oblata ca. 55 μ m alta et ca. 65 μ m lata valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Goiás: Serra dos Cristais, 17°S, 48°W. Campo, ca. 2 km N of Cristalina. Elev. 1250 m. Herb to ca. 25 cm tall.

Heads magenta. 2 March 1966. *H.S.Irwin, J.W.Grear, Jr., R.Souza & R.Reis dos Santos 13309* (Holotype, UB; isotype, US). PARATYPES: BRASIL: Goiás: same data as Type. Herb ca. 8 cm tall. *Irwin et al. 13304* (NY); Campo, ca. 10 km W of Cristalina. Elev. 1200 m. Erect herb ca. 15 cm tall. 5 March 1966. *Irwin et al. 13534* (NY); Chapada dos Veadeiros, ca. 19 km N of Alto do Paraíso. Elev. ca. 1250 m. Campo. Cerrado on steep rocky slopes, surrounded by campo. Herb to ca. 50 cm tall. Heads magenta. 20 March 1971. *H.S.Irwin, R.M.Harley & G.L.Smith 32817* (US).

The new species seems close to *V. irwinii* Barroso and *V. bardanoides* Less. which have similar erect narrowly pointed uncostate involucre bracts and corollas with throats exerted well beyond the tips of the pappus setae at anthesis. The new species differs by the characteristically limited number of heads in the inflorescence, the shorter tips on the involucre bracts which never exceed the pappus at anthesis, by the distinctly clavate tips of the pappus setae, and by the denser tomentum on the undersurfaces of the leaves. A variety *uniflora* Barroso of *V. irwinii* can apparently have a single head in the inflorescence, but the isotype of the variety at the USNH is a plant with a series of 5 heads. The new species also tends to differ by the generally smaller leaves with fewer secondary veins, and by the shorter less squamiform outer series of the pappus.

VERNONIA ECHINOCEPHALA H. Robinson, sp. nov.

Plantae suffruticosae vel fruticosae ad 2 m altae mediocriter ramosae. Caules nigrescentes teretes distincte costati breviter cinereo-sericei juvenales dense albe sublanati. Folia alterna sessilia; laminae lanceolatae plerumque 2.5-6.0 cm longae et 0.5-1.5 cm latae base leniter constrictae margine integrae anguste reflexae apice acutae et minute apiculatae supra dense sericeo-puberulae subtus perdense albo-sericeae, nervis secundariis paucis brevibus ascendentibus. Inflorescentiae diffusae, pedunculis elongatis ad 8 cm longis non ramosis dense albo-sublanatis. Capitula solitaria campanulata ad 18 mm alta et 14 mm lata; squamae involucri ca. 400-500 subimbricatae 7-9-seriatae patentes vel erecto-patentes lineares 3-12 mm longae et 0.5-1.0 mm latae superne rubro-tinctae apice longe pungentes extus albo-sericeae. Flores ca. 50 in capitulo. Corollae lavandulae 10-11 mm longae, tubis anguste infundibularibus ca. 7 mm longis extus glabris, faucibus ca. 0.7 mm longis glabris, lobis linearibus ca. 3.5 mm longis et 0.5-0.6 mm latis extus plerumque glabris subapice pauca spiculiferis et minute glanduliferis; thecae antherarum ca. 2.7 mm longae; appendices antherarum oblongo-ellipticae ca. 0.45 mm longae et 0.22 mm latae extus glabrae; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longi, rami stylorum extus plerumque contorte vel inflexe hispiduli. Achaenia ca. 1.8 mm longa longe setifera; setae pappi persistentes ca. 30 ca. 7 mm longae apice leniter latiores margine dense scabridulae extus pauca minute scabridulae, squamae exteriores lineares ca. 2 mm

longae ad 0.1 mm latae extus sublaeves. Grana pollinis in diametro ca. 50 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation near *V. arenaria*-Type but with incomplete additional cross-walls in colpar area above and below pores.

TYPE: BRASIL: Goiás: ca. 20 km N of Alto do Paraíso. Elev. ca. 1250 m. Disturbed places, gallery margin. Gallery forest and adjacent wet campo (Brejo). Subshrub ca. 1.5 m tall. Heads lilac-magenta. 19 March 1971. *H.S. Irwin, R.M. Harley & G.L. Smith 32220* (Holotype, UB; isotype NY). PARATYPE: BRASIL: Goiás: Chapada dos Veadeiros, 14°S, 47°W. ca. 20 km W of Veadeiros. Elev. 1000 m. Creek margin, among racks. Shrub ca. 2 m tall. In bud. 9 Feb. 1966. *H.S. Irwin, J.W. Grear, Jr., R. Souza, R. Reis dos Santos 12438* (US).

Vernonia echinocephala is probably related to *V. holosericea* Mart. ex DC. and *V. pungens* Gardn. which also show the extreme development of many rows of slender pointed outer involucre bracts. The new species seems to have the largest number of bracts of any of the group. The new species has the heads solitary on long peduncles, and has broader leaves with the undersurfaces covered with dense white pubescence.

VERNONIA FONSECAE H. Robinson, sp. nov.

Plantae suffruticosae erectae ad 1.5 m altae. Caules teretes striati glabri. Folia alterna sessilia vel subsessilia; laminae oblongae vel oblongo-ellipticae plerumque 4-9 cm longae et 2.5-5.5 cm latae base breviter cordatae subamplexicaules margine integrae apice rotundatae vel breviter obtusae et minute apiculatae supra et subtus glabrae subtus minute glandulo-punctatae, glandulis immersis nigrescentibus, nervis et nervulis utrinque reticulis minutis subtiliter prominulis, nervis secundariis utrinque plerumque 8-14 valde patentibus et leniter arcuatis basilaribus aliquantum retroritis. Inflorescentiae non ramosae rectae vel subrectae, internodiis glabris, bracteis foliiformibus ad 6.5 cm longis et 4.0 cm latis glabris. Capitula remota vel remotiuscula uniseriata sessilia axillaria vel extra-axillaria; involucre late campanulata 12-15 mm alta et lata post anthesin non vel pauce constricta; squamae involucri brunnescentes ca. 80 subimbricatae ca. 6-seriatae plerumque appressae late ovatae vel lineari-lanceolatae 3-14 mm longae et 2-4 mm latae apice breviter obtusae vel acutae margine dense breviter setuliferae margine et extus evanescentiter sparse flexuose piliferae, interiores apice rubro-tinctae. Flores ca. 45 in capitulo. Corollae lavandulae in textura tenues 15-20 mm longae extus plerumque glabrae, tubis cylindraceis 6-10 mm longis et 0.8 mm latis, faucibus anguste infundibularibus 3-4 mm longis, lobis lineari-lanceolatis ca. 5 mm longis et 0.6 mm latis apice minute glanduliferis et breviter carnosae appendiculatis; thecae antherarum 5 mm longae; appendices antherarum ovatae ca. 1 mm longae et 0.28 mm latae apice breviter acutae margine leniter recurvatae extus glabrae; scapi stylorum

in partibus hispidulis superioribus ca. 3 mm longi. Achaenia ca. 3.5 mm longa dense longe setifera superne in punctis superficialibus 1-3-cellulatus subglanduliformibus dense ornata; setae pappi persistentes ca. 50 plerumque ca. 11 mm longae apice latiores margine perdense scabridulae extus sparsius scabridulae, squamae exteriores anguste lanceolatae 1.5-2.0 mm longae et ca. 0.2 mm latae apice anguste acutae extus laeves. Grana pollinis leniter oblata in diametro ca. 75-80 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, ca. 20 km south of Alto do Paraíso (formerly Veadeiros). Elev. 1000 m. Campo on steep slopes with occasional outcrops. Erect shrub ca. 1.25 m tall. Heads magenta. 20 March 1969. *H.S. Irwin, R. Reis dos Santos, R. Souza & S.F. da Fonseca 24698* (Holotype, US). PARATYPES: BRASIL: Goiás: Chapada dos Veadeiros, ca. 7 km south of Cavalcante. Elev. 1000 m. Valley. Cerrado on steep rocky slopes and sandy valley flats below. Erect subshrub to ca. 1.5 m tall. Heads magenta. 8 March 1969. *Irwin et al. 24040* (US); Ca. 30 km north of Veadeiros. Elev. 1000 m. Outcrops. Gallery woods and campo with outcrops. Erect herb or subshrub to ca. 1.5 m tall. Heads magenta. 16 March 1969. *Irwin et al. 24503* (US).

Vernonia fonscae is in the general relationship of *V. mori* H. Robins. and *V. ammophila* Gardn., having large heads in a seriatly cymose inflorescence bearing large foliose bracts. The new species is immediately distinguished by the large, erect, smooth, glabrous, sessile leaves having cordate bases that sometimes slightly clasp the stem.

VERNONIA GREARII H. Robinson, sp. nov.

Plantae suffruticosae; rhizomata horizontalia breviter. Caules primarii erecti interdum aggregati in partibus inferioribus non vel paucis ramosi ad 1 m alti brunnescentes teretes vel subpentagonales paucis striati superne evanescentiter tenuiter arachnoideo-tomentosi. Folia alterna sessilia linearia plerumque 5-12 cm longa et ad 2 mm lata margine integra valde recurvata apice anguste acuta supra sparse scabridula in nervis primariis pallida distincte prominentia subtus distincte pallide tomentosa, nervis secundariis perbrevibus indistinctis. Inflorescentiae laxae cymosae paucis capitatae, bracteis foliiformibus, pedunculis plerumque elongatis ad 28 mm longis tenuiter canescentiter tomentosis. Capitula campanulata 12-14 mm alta et ca. 7-8 mm lata; squamae involucri violaceae ca. 70 subimbricatae 5-6-seriatae appressae orbiculares vel oblongae 0.5-8.0 mm longae et 1.0-2.3 mm latae apice rotundatae vel breviter obtusae margine dense minute albo-fimbriatae extus sparse evanescentiter arachnoideo-tomentosae superne ad medio multo glandulo-punctatae. Flores ca. 25 in capitulo. Corollae lavandulae ca. 10 mm longae, tubis anguste infundibularibus ca. 5 mm longis extus glabris, faucibus ca. 1.7 mm longis glabris, lobis lineari-lanceolatis ca. 3 mm

longis et 0.5-0.6 mm latis plerumque glabris apice pauce piliferis et minute glanduliferis; thecae antherarum ca. 3.3 mm longae; appendices antherarum ovato-lanceolatae ca. 0.5 mm longae et ca. 0.2 mm latae extus glabrae, cellulis marginalibus lateralibus subdistinctis; basi stylorum vix noduliferis; scapi stylorum in partibus hispidulis superioribus ca. 1 mm longi. Achaenia ca. 3.5 mm longa intra costas subdense sericeo-setifera; setae pappi sordidae ca. 40 plerumque 5.5-6.0 mm longae superne distincte latiores plerumque in marginis scabridulae ad apicem margine et extus dense scabridulae; squamae exteriores anguste lanceolatae vel lineares 1-2 mm longae extus minute spiculiferae. Grana pollinis leniter oblata ca. 47 μ m alta et 55 μ m lata valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, ca. 10 km N of Alto do Paraíso, elev. ca. 1250 m. Cerrado. Cerrado on outcrops with adjacent wet campo (brejo). Subshrub ca. 1 m tall. Heads lavender-magenta. 24 March 1971. *H.S. Irwin, R.M. Harley & G.L. Smith 33090* (Holotype, UB; isotype, US). PARATYPES: BRASIL: Goiás: Chapada dos Veadeiros, ca. 20 km W of Veadeiros. Elev. 1000 m. Rocky slopes and wet campo. Slender herb ca. 1 m tall. In bud. 11 Feb. 1966. *H.S. Irwin, J.W. Grear, Jr., R. Souza & R. Reis dos Santos 12565* (US); Ca. 10 km W of Veadeiros. Elev. 1000 m. Outcrops and sandy campo. Slender herb ca. 1 m tall. In bud. 15 Feb. 1966. *H.S. Irwin, J.W. Grear, Jr., R. Souza & R. Reis dos Santos 12863* (NY); Ca. 20 km N of Alto do Paraíso, elev. ca. 1250 m. Gallery margin. Gallery forest and adjacent wet campo (brejo). Subshrub to ca. 1 m tall. Heads lilac-magenta. 19 March 1971. *H.S. Irwin, R.M. Harley & G.L. Smith 32161* (US).

Vernonia grearii is closely related to *V. compactiflora* Mart., described from Mato Grosso, but the latter is a generally more robust plant with longer peduncles, larger heads containing 40-50 flowers, and more persistent pubescence on the stems. All leaves that have been seen of the new species are essentially filiform, with the pubescence of the undersurface only narrowly visible between the midrib and the strongly revolute margins.

VERNONIA HAGEI H. Robinson, sp. nov.

Plantae herbaceae ad 1 m altae. Caules virides vel brunnescentes teretes pauce costati evanescentiter sparse pilosi vel subglabri. Folia alterna, petiolis 2-5 mm longis dense pilosis; laminae lanceolatae vel oblongo-lanceolatae plerumque 4.5-13.0 cm longae et 1.5-2.5 cm latae base rotundatae vel subtiliter subcordatae integrae vel remote obscure subserrulatae anguste revolutae apice acutae et minute mucronulatae supra lucidae sparse evanescentiter strigulosae subtus sparse sericeo-strigosae et multo glandulo-punctatae, nervis secundariis ascendentiter arcuatis. Inflorescentiae terminales multo ramosae, ramis serialiter cymosis in nodis vix vel non deflectis distincte costatis et breviter pilosis, bracteis foliiformibus ovatis vel

anguste ovatis plerumque 0.4-3.5 cm longis et 0.3-1.6 mm latis. Capitula in seriebus solitaria vel raro geminata sessilia axillaria vel interdum alternantiter extra-axillaria campanulata 12-13 mm alta et 8-13 mm lata; squamae involucri virides ca. 50-60 ca. 4-5-seriatae exteriores patentes omnino lanceolatae vel lineari-lanceolatae 3-10 mm longae et ca. 1.0-1.5 mm latae apice longe pungentes margine inferne pallidiores et anguste scariosae superne sparse piloso-fimbriatae extus in squamis exterioribus superne sparse pilosis in squamis interioribus superne dense minute scabridulis. Flores ca. 25-30 in capitulo. Corollae albae in textura tenues ca. 7.5 mm longae, tubis anguste infundibularibus ca. 3.5 mm longis extus glabris vel subglabris, faucibus ca. 1 mm longis glabris, lobis oblongo-lanceolatis ca. 3.0 mm longis et 0.6 mm latis superne reflexis extus plerumque glabris ad apicem dense spiculiferis et breviter setiferis, setis multi-cellularibus biseriatis non glandulosis; thecae antherarum ca. 3 mm longae; appendices antherarum oblongo-ovatae ca. 0.5 mm longae et 0.28 mm latae apice rotundatae extus glabrae; scapi stylorum in partibus superioribus non hispiduli; rami stylorum ca. 3 mm longi extus hispiduli. Achaenia ca. 1.5 mm longa dense setifera; carpopodia in superficie superiore setifera; setae pappi subsistentes ca. 60 plerumque 5-6 mm longae apice leniter latiores margine et extus dense scabridulae; squamae exteriores lineari-lanceolatae ca. 1 mm longae et ad 0.13 mm latae apice anguste acutae extus laeves. Grana pollinis in diametro ca. 50 μ m valde lophorata, cristis altis minute spinuliferis, spinis majoribus nullis (reticulation *V. geminata*-Type).

TYPE: BRASIL: Bahia: Município de Rio de Contas, entre Rio de Contas e Mato Grosso a 9 km ao N de Rio de Contas. Elev. ca. 1000 meters. Herb to ca. one meter tall, flowers white. July 20, 1979. *R.M. King, S. Mori, T.S. dos Santos & J.L. Hage* 8059 (Holotype, RB; isotypes, CEPEC, US).

Vernonia hagei is a member of the *V. geminata* group, and is like *V. geminata* and *V. alvimii* in the presence of glands on the undersurfaces of the leaves and lack of large foliose bracts in the inflorescence. The new species differs from both relatives by the longer lanceolate leaves and by the inflorescence with larger more remote heads. Further differences include the lack of recurved lower involucre bracts of the type seen in *V. geminata*, and the presence of a larger number of bracts and flowers in the heads than in *V. alvimii*. The new species rather resembles the widely distributed *V. salzmannii* DC., but the latter is a more pubescent species with shorter involucres and *V. cognata*-Type pollen, being more closely related to *V. lilacina* Mart.

The carpopodium is basically an abscission zone, but in at least the *V. geminata* group of *Vernonia* the upper parts of the differentiated cap seem to represent epidermal tissue. A number of members of the group bear setae or even glands on this upper carpopodial surface. This is seen best in *V. hagei* of the

brasilian species examined. Pubescence has not been noticed in any other tribe below the upper edge of the carpopodium.

VERNONIA PIRESII H. Robinson, sp. nov.

Plantae fruticosae 2-3 m altae mediocriter ramosae. Caules teretes striati dense sordide tomentosi. Folia alterna, petiolis brevibus 2-4 mm longis; laminae herbaceae obovatae vel leniter obpanduriformes plerumque 5-9 cm longae et 2.8-4.8 cm latae base abrupte anguste rotundatae margine superne multo subserrulatae apice late rotundatae supra in sicco atro-virides dense minute pilosulae in nervis primariis palide subtomentosae subtus laxe sordide vel fulve tomentosae, nervis secundariis utrinque ca. 10 ca. 35° - 45° ascendentibus. Inflorescentiae terminales multo ramosae, ramis scorpioideo-cymosis dense breviter sordide tomentosis, bracteis nullis vel subnullis. Capitula in seriebus duibus alterne secunde disposita subsessilia late campanulata ca. 8 mm alta et 6-7 mm lata; squamae involucri ca. 45 fulvescentes subcoriaceae subimbricatae 4-5-seriatae breviter ovatae vel anguste oblongae ca. 1.0-4.5 mm longae et 0.8-1.3 mm latae apice breviter acutae et in carinis brevibus minute apiculatae margine anguste subscariosae superne dense minute fimbriatae extus plerumque glabrescentibus superne in maculis brunnescentibus glandulopunctatae. Flores ca. 20 in capitulo. Corollae ca. 6 mm longae, tubis anguste infundibularibus ca. 2 mm longis extus glabris, faucibus ca. 1.5 mm longis glabris, lobis oblongo-lanceolatis ca. 2 mm longis superne multo glanduliferis, nervis loborum submarginalibus; thecae antherarum ca. 2 mm longae; appendices antherarum anguste ovatae ca. 0.6 mm longae et base 2.3 mm latae apice anguste rotundatae extus minute spiculiferae; nodi stylorum late disciformes margine pauca denticulati; scapi stylorum in partibus superioribus sparse hispidulis perbreves subnulli. Achaenia ca. 2 mm longa in costis breviter setifera inter costas dense glandulo-punctata et pustulifera, pustulis 1-4-cellularis; setae pappi ca. 35 plerumque 4.0-4.5 mm longae apice leniter latiores margine et extus dense scabridulae; series exteriores setiformes 0.3-0.9 mm longae dense scabridulae. Grana pollinis in diametro ca. 40 μ m irregulariter areolata et spinulosa (*Lychmophora*-Type).

TYPE: BRASIL: Mato Grosso: 85 km from Cuiaba en route to Rondonopolis. Frequent in hilly cerrado. Woody shrub 2-3 m high, 3-5 cm diam, post-flowering. Sept. 28, 1963. *B. Maguire, J. Murca Pires, C.K. Maguire & Nilo T. Silva 56893* (Holotype, UB; isotype, NY).

The inflorescence having no obvious bracts, the close-set secundly borne heads, and the pollen type all suggest the new species is closely related to *V. scorpioides* Pers. but the blunt obovate leaves are thoroughly distinct. The involucre also differs, being more like that of *V. brasiliensis* and related species which have non-scorpioid more divaricately branched inflorescences.

VERNONIA PINHEIROI H. Robinson, sp. nov.

Plantae fruticosae ad 2 m altae multo ramosae. Caules teretes vel leniter angulati canescentiter perdense hispiduli, pilis sub-T-formibus irregulariter glebosis apice argute acutis. Folia alterna, petiolis ca. 5-10 mm longis; laminae ovatae plerumque 3.5-7.0 cm longae et 1.4-3.0 cm latae base breviter acuminatae margine integrae apice acutae vel vix acuminatae supra et subtus perdense canescentiter pubescentes et perdense glandulo-punctatae, nervis primariis ad medio sulcatis, nervis secundariis utrinque ca. 5-6 ca. 45° ascendentibus leniter arcuatis. Inflorescentiae in ramis terminales paucae ramosae, ramis serialiter cymosis in nodis leniter deflectitis perdense canescentiter hispidulis, bracteis foliiformibus plerumque 1.5-2.5 cm longis et 0.6-0.9 cm latis. Capitula in seriebus solitaria sessilia vel subsessilia axillares vel raro extra-axillares campanulata ca. 11-12 mm alta et ca. 7 mm lata; squamae involucri fusciscentes ca. 50 subimbriatae ca. 4-5-seriatae erecto-patentes lineari-lanceolatae 2-10 mm longae et 0.5-1.5 mm latae apice longe pungentes margine inferne subscariosae et pallidiores extus in vittis medianis latis sparse puberulae et superne multo punctatae. Flores ca. 25 in capitulo. Corollae lavandulae ca. 9 mm longae extus plerumque sparse minute glanduliferae, tubis anguste infundibularibus ca. 5 mm longis, faucibus ca. 0.7 mm longis, lobis lineari-lanceolatis ca. 3 mm longis et ca. 0.6 mm latis ad apicem paucae minute spiculiferis et dense glandulo-punctatis; thecae antherarum ca. 2.7 mm longae; appendices antherarum oblongo-ovatae ca. 0.4 mm longae et 0.23 mm latae apice rotundatae extus glabrae; nodi stylorum papillosoi; scapi stylorum in partibus hispiduli superioribus ca. 0.7 mm longi. Achaenia ca. 2 mm longa dense longe sericeo-setifera et multo breviter glandulifera; setae pappi ca. 37 ca. 5 mm longae superne vix vel non latiores margine dense scabridulae extus subcomplanatae minute remote scabridulae, scabridis minute hyaline apiculatis, squamae extiores lineari-lanceolatae ad 1.8 mm longae et ad 0.15 mm latae extus sparse minute scabridulae. Grana pollinis in diametro ca. 50-55 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. arenaria*-Type).

TYPE: BRASIL: Bahia: Serra do Açuruá. São Inácio, on rocky hillside called Pedra da Mulher just south of town. Alt. ca. 500-600 m. ? Metamorphosed sandstone. Approx. 42°44'W, 11°07'S. This plant on summit of rocks. Shrub, much branched to 2 m. Leaves grey, paler beneath. Phyllaries pale green with pale straw setose tips. Corolla lilac. 25 Feb. 1977. *R.M. Harley, S.J. Mayo, R.M. Storr, T.S. Santos & R.S. Pinheiro 19028* (Holotype, CEPEC; isotype US).

The new species is very close to *V. arenaria* Mart., described from the State of Piauí immediately to the north of Bahia. On the basis of the plate of *V. arenaria* in Baker (1873) and an isotype of its synonym, *V. sarmentiana* Gardn., the latter species has blunter leaf-tips, more subtruncate leaf bases, and much

shorter abruptly acuminate involucre bracts. The involucre bracts of the new species exceed the length of the florets at anthesis, while the bracts of *V. arenaria* are obviously exceeded by the florets. On the basis of the Gardner type, the two species share the lumpy, often sub-T-form hairs of the stems and leaves and the median furrow on the undersurface of the midvein of the leaf.

VERNONIA PSEUDOPIPTOCARPHA H. Robinson, sp. nov.

Plantae fruticosae ca. 2 m altae. Caules brunnescentes subhexagonales et subtiliter striati minute puberuli vel subtomentelli et sparse minute glanduliferi. Folia alterna breviter petiolata, petiolis ad 10 mm longis; laminae oblongo-ovatae vel ovato-ellipticae ad 13 cm longae et 7 cm latae base breviter acutae interdum inaequales margine integrae vel minute mucronato-denticulatae anguste indistincte reflexae apice acutae vel breviter acuminatae supra dense breviter pilosae subscabridae subtus plerumque in nervis et nervulis puberulae, nervis et nervulis majoribus prominentibus, nervis secundariis utrinque ca. 9 recte patentibus vel leniter ascendentibus. Inflorescentiae multo ramosae, ramis serialiter cymosis interdum subtiliter in nodis deflectis subtomentellis et sparse minute glanduliferis; bracteis foliiformibus breviter petiolatis in laminis ovatis 2.0-6.5 cm longis et ca. 1-3 cm latis apice plerumque breviter acutis. Capitula in seriebus solitaria vel geminata sessilia anguste campanulata vel subcylindrica ca. 9-10 mm alta et 5 mm lata; squamae involucri fulvescentes ca. 35 subimbricatae 5-6-seriatae plerumque appressae 1.5-6.0 mm longae ad 1.8 mm latae, exteriores ovatae breviter acutae margine anguste scariosae et dense minute fimbriatae extus inferne glabrescentes superne sparse appresse puberulae, interiores oblongo-lanceolatae vel lineares apice obtusae margine albo-fimbriatae superne extus dense minute glanduliferae et canescentiter subtomentellae. Flores ca. 15 in capitulo. Corollae lavandulo-purpureae ca. 6 mm longae extus subglabrae in medio sparse minute glanduliferae, tubis cylindraceis 3-4 mm longis, faucibus 0.5-1.0 mm longis, lobis lineari-lanceolatis 2.5 mm longis et 0.5 mm latis apice extus dense minute glanduliferis; thecae antherarum ca. 2.5 mm longae; appendices antherarum ovato-lanceolatae breviter acutae ca. 0.5 mm longae et 0.2 mm latae extus glabrae; scapi stylorum fere ad ramos glabri. Achaenia immatura ad 2 mm longa plerumque glabra base juxta carpodia pauca breviter setifera; setae pappi interiores facile deciduae ca. 30 plerumque 5.0-5.5 mm longae plerumque anguste complanatae base sensim angustiores margine perdense scabridulae extus sparsius scabridulae apice subobtusae, squamae exteriores numerosae oblongae vel lanceolatae ad 1 mm longae et plerumque 0.10-0.25 mm latae. Grana pollinis in diametro ca. 45 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyro-*

phyllum-Type).

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, ca. 10 km south of Cavalcante. Elev. 1000 m. Gallery margin. Gallery and adjacent cerrado. Shrub ca. 2 m tall. Heads dull lavender-purple. 8 March 1969. H.S. Irwin, R. Reis dos Santos, R. Souza & S.F. da Fonseca 24081 (Holotype, US).

The new species has a habit reminiscent of members of the genus *Piptocarpha*, with usually two heads clustered in the axils of short-petiolate, leaflike bracts. The details of the florets are, nevertheless, entirely *Vernonia*. The *V. argyrophylla*-Type pollen indicates that the new species is not even closely related to *Piptocarpha* or to various species of *Vernonia* mostly from the Andean Region which resemble *Piptocarpha*.

VERNONIA REGIS H. Robinson, sp. nov.

Plantae fruticosae 1.0-1.5 m altae laxae ramosae. Caules brunnescentes teretes striati superne dense sericei. Folia alterna breviter petiolata, petiolis 2-4 mm longis; laminae late ellipticae vel oblongae plerumque 2.0-4.5 cm longae et 1.5-3.2 cm latae base obtusae vel breviter acutae margine integrae apice obtusae vel rotundatae et minute mucronatae velutinae inferne sensim sublanatae subtus dense sericeae non glanduliferae, nervis secundariis pinnatis ascendentibus laxe arcuatis utrinque 3-4. Inflorescentiae multo ramosae, ramis scorpioideo-cymosis dense fulvo-sericeis vel breviter lanatis, bracteis distinctis subsessilibus ovatis vel ellipticis ad 15 mm longis et 8 mm latis apice breviter acutis subtus breviter lanatis. Capitula congesta plerumque in nodis solitaria ca. 13 mm alta et 4-5 mm lata; squamae involucri ca. 28 subimbricatae 4-5-seriatae non patentae ovatae vel lanceolatae 1-8 mm longae et 1-2 mm latae apice acutae vel breviter mucronatae, exteriores plerumque in medio virides margine dense longe fimbriatae extus dense sericeae, interiores superne purpurascens sparse vel evanescentiter sericeae. Flores ca. 10 in capitulo. Corollae purpureae in textura tenues 8-9 mm longae in tubis faucibus et apicibus loborum minute glanduliferae, tubis cylindraceis ca. 2.5 mm longis et 1 mm latis, faucibus superne vix latioribus ca. 1.3 mm longis, lobis linearibus ca. 3.5 mm longis et ca. 0.5 mm latis extus superne breviter indurate spiniformibus; thecae antherarum ca. 2.7 mm longae; appendices antherarum ovatae ca. 0.5 mm longae et 0.25 mm latae apice breviter acutae extus glabrae; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longi. Achaenia ca. 2 mm longa dense sericeo-setifera; setae pappi interiores subdeciduae ca. 37 plerumque 7.5-8.5 mm longae superne vix latiores subcomplanatae margine perdense scabridulae extus sparsius scabridulae, squamae exteriores lanceolatae ca. 2.5 mm longae et ca. 0.4 mm latae in marginem distincte imbricatae apice anguste acutae extus minute sparse scabridulae. Grana pollinis in diametro ca. 50 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation near *V. argyrophylla*-Type

with extra cross-walls in colpar area above and below pores.

TYPE: BRASIL: Bahia: Município de Mucugê, a 3 km ao S de Mucugê. Na estrada que vai par Jussiape. Elev. ca. 1000 meters. Shrub 1-1½ meters tall, flowers purple. July 26, 1979. *R.M.King, S.Mori, T.S.dos Santos & J.Hage 8158* (Holotype, RB; isotypes CEPEC, US).

The new species seems most closely related to species such as *V. tragiaefolia* DC. and *V. megapotomica* Spreng. of Section *Stenoccephalum*, having reduced numbers of involucre bracts and flowers in the heads. *Vernonia regis* has a particularly colorful inflorescence with purplish corollas and bracts and with a greenish median band on the outer involucre bracts.

The species is named for Robert M. King who has been responsible for the collection of a number of species described in this paper.

VERNONIA SANTOSII H. Robinson, sp. nov.

Plantae herbaceae perennes ad 4.5 dm altae vegetative acaulescentes. Radices palares subtuberosae. Folia rosulata sessilia; laminae in sicco coriaceae subcarnosae? obovatae plerumque 4-7 cm longae et 1.5-2.2 cm latae base cuneatae margine integrae distincte incrassate limbatae apice rotundatae vel breviter obtusae supra et subtus sparse evanescentiter villosae subtus plerumque in nervis primariis persistentiter sub-lanatae, nervis secundariis obscuris utrinque ca. 4 valde ascendentibus. Inflorescentiae erectae longe scaposae superne non vel uni-ramosae, scapis dense villosis vel sub-lanatis non vel paucae remote bracteiferis, capitulis solitariis vel in cymis positis sessilibus vel variabiliter peduncatis. Capitula late campanulata 13-17 mm alta et 15-25 mm lata; squamae involucri in partibus superioribus purpureo-tinctae ca. 55 subimbricatae 4-5-seriatae appressae oblongae vel lineari-lanceolatae 2-14 mm longae et inferne 1.5 vel 2.5 mm latae extus dense villosae margine inferne anguste scariosae albae apice in squamis exterioribus breviter apiculatae in squamis interioribus lineariter acuminatae. Flores ca. 50 in capitulo exteriores praecoces. Corollae lavandulae in textura subtenues 10-11 mm longae, tubis anguste infundibularibus 5-6 mm longis, faucibus ca. 1 mm longis, tubis et faucibus extus sparse minute glanduliferis, lobis linearibus 4-5 mm longis et ca. 0.6 mm latis subapice dense glandulo-punctatis ceterum extus glabris; thecae antherarum ca. 4 mm longae base in partibus breviter caudatae; appendices antherarum ovatae ca. 0.5 mm longae et 0.28 mm latae apice obtusae extus glabrae; scapi stylorum in partibus hispidulis superioribus ca. 1.5 mm longi. Achaenia ca. 2.5 mm longa perdense longe setifera; setae pappi persistentes ca. 35 plerumque 8.5-9.0 mm longae apice vix vel non lateriores margine et extus dense scabridulae, squamae exteriores lineari-lanceolatae 2.5-3.0 mm longae et ad 0.25 mm latae apice anguste acutae margine perdense scabridulae extus sparse spiculiferae. Grana pollinis in diametro 50-55 um valde lophorata, cristis altis

minute multo spinuliferis, spinis majoribus nullis (reticulation near *V. argyrophylla*-Type with additional cross-walls in colpar area above and below pores).

TYPE: BRASIL: Bahia: Município de Rio de Contas. Base de Pico das Almas, a 18 km ao NW de Rio de Contas. Elev. ca. 1300 meters. Ray flowers lavender, disc flower yellow-brown. July 24, 1979. *R.M.King, S.Mori, T.S.dos Santos & J.Hage 8117* (Holotype, RB; isotypes CEPEC, US). PARATYPE: BRASIL: Bahia: Município de Rio de Contas, a 4 km ao NW de Rio de Contas. Campo rupestre. Elev. 1000 meters. Ray flowers lavender, disc flowers yellow. July 21, 1979. *King et al. 8064* (CEPEC, US).

The new species is distinguished from most members of *Vernonia* by the acaulescent or short-caulescent habit. Other such species from Brasil include *V. bellioides* Ekman, *V. cephalotis* DC., *V. hypochaeris* DC., *V. hypochlora* Malme and *V. sellowii* Less., but only the last from southern Brasil, shows a tendency toward a similar seriatly cymose inflorescence. None of the other species shows the same type of entire, distinctly rimmed leaf margin seen in the new species, and there is no reason to believe that the various acaulescent species are necessarily closely related either to *V. santosii*, or to each other. At least one, *V. hypochlora*, seems more closely related to *V. cognata* Less. and *V. herbacea* (Vell.) Rusby.

The field notes on both collections indicate a head with lavender ray flowers and yellowish disk flowers. Closer examination shows that the outer series of flowers is formed of normally shaped but precociously developed outer discoid corollas. The distinctive feature is the manner in which the inner disk flowers, as a well-defined group, remain in bud and buried in the yellowish pappus until after the outer corollas have fallen. One head has been seen showing the later stage where the inner group of flowers is in bloom.

VERNONIA SODERSTROMII H. Robinson, sp. nov.

Plantae suffruticosae; rhizomata horizontalia breviter. Caules primarii erecti interdum aggregati in partibus inferioribus non ramosi 30-50 cm alti apice multo ramosi atro-rubrescentes sub-hexagonales evanescentiter dense sordido-tomentosi, ramis per-dense fulvo-tomentosis. Folia alterna subsessilia in caulis primariis mox decidua non visa, petiolis ad 1 mm longis; laminae oblongae plerumque 10-20 mm longae et 5-7 mm latae base obtusae vel rotundatae margine integrae vel subintegrae apice rotundatae supra tenuiter pallide sericeo-velutinae subtus dense fulvo-tomentosae, nervis secundariis utrinque ca. 3 plerumque 40°-50° ascendentibus vix arcuatis. Inflorescentiae multo ramosae, ramis serialiter cymosis subtiliter deflectis dense sordide tomentosis, bracteis foliiformibus subsessilibus plerumque 10-15 mm longis et 5-6 mm latis. Capitula in seriebus solitaria sessilia axillaribus vel extra-axillaribus campanulata ca. 10 mm alta et 7-8 mm lata; squamae involucri ca. 37 subimbricatae ca. 4-seriatae

plerumque appressae 3-7 mm longae et 0.8-1.5 mm latae apice argute acutae margine inferne anguste scariosae et dense fimbriatae extus inferne sericeae superiore margine et extus dense sordido-villosae. Flores ca. 19 in capitulo. Corollae lavandulae vel pallidiores, tubis anguste unfundibularibus ca. 5 mm longis plerumque glabris superne sparse setiferis, setis in cellulis biseriatis, faucibus ca. 0.5 mm longis extus glabris, lobis lineari-lanceolatis ca. 4 mm longis et 0.5 mm latis apice dense spiculiferis minute papillosis extus ceterum glabris, spiculis brevibus argutis in cellulis uniseriatis; thecae antherarum ca. 2.5 mm longae; appendices antherarum anguste oblongae breviter acutae extus glabrae; scapi stylorum in partibus hispidulis superioribus ca. 1 mm longi. Achaenia immatura ad 1.5 mm longa dense longe setifera; setae pappi persistentes interiores ca. 40 plerumque ca. 6 mm longae apice leniter latiores margine perdense scabridulae extus sparsius scabridulae, setae exteriores anguste lineares 1.5-2.0 mm longae apice spiniformes margine dense scabridulae extus planae et laeves. Grana pollinis in diametro 50-55 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Goiás: Serra do Caiapó, ca. 50 km S of Caiaponia on road to Jataí. Rock summit of mesa, near escarpment, 17° 12'S, 51° 47'W. Elev. 800-1000 m. Subshrub ca. 75 cm tall. Heads magenta. n = ca. 16, det by B.L.Turner. Oct. 25, 1964. *H.S. Irwin & T.R.Soderstrom 7334* (Holotype, US). PARATYPE: BRASIL: Goiás: Serra do Caiapó, ca. 48 km S of Caiaponia on road to Jataí, among campo grasses at summit of cliff. 17° 12'S, 51° 47'W. Elev. 800-1000 m. Heads in bud. Oct. 23, 1964. *H.S.Irwin & T.R.Soderstrom 7262* (US).

The two collections of the new species both show the distinctive erect leafless primary stems ending above abruptly in a densely branching leafy crown. The species may be close to the series discussed below with *V. souzae*, but the involucre bracts of *V. soderstromii* present a different appearance from any of them, having a thinner, more evenly distributed, less erect pubescence and being more obviously lanceolate in shape.

VERNONIA SOUZAЕ H. Robinson, sp. nov.

Plantae suffruticosae erectae ca. 1 m altae mediocriter ramosae. Caules teretes vel subhexagonales dense brunnescentiter velutini. Folia alterna, petiolis 1-8 mm longis dense velutinis; laminae oblongae vel oblanceolatae plerumque 2-11 cm longae et 0.8-3.0 cm latae base obtusae vel breviter acutae margine remote sub serrulatae apice rotundatae supra dense sordido-velutinae subtus dense flavo-tomentosae, nervis secundariis patentibus ascendenter arcuatis. Inflorescentiae mediocriter ramosae, ramis serialiter cymosis in nodis vix deflectis dense sordide velutinis, bracteis foliiformibus plerumque 1.5-4.0 cm longis et 0.8-2.0 cm latis. Capitula in seriebus solitaria vel raro geminata sessilia axillares vel raro extra-axillares ca. 11-13 mm alta

et 8-10 mm lata; squamae involucri ca. 40 subimbricatae 4-5-seriatae plerumque appressae vel in apicem leniter patentem ovatae vel lanceolatae 2-10 mm longae et 1.5-2.0 mm latae apice argute acutae sed extus et margine in pubescentia dense velutina et sordida occultae. Flores ca. 20 in capitulo. Corollae lavandulae in textura tenues 10-11 mm longae in tubis et faucibus extus glabrae, tubis anguste infundibularibus 6.0-6.5 mm longis, faucibus ca. 0.8 mm longis, lobis lineari-lanceolatis ca. 4 mm longis et ca. 0.6 mm latis inferne extus glabris subapice spiculiferis interdum breviter glanduliferis et pauca longe setiferis, setis in cellulis uniseriatis, cellulis apicalibus setarum ad 0.7 mm longis; thecae antherarum ca. 3 mm longae; appendices antherarum ovatae 0.5-0.6 mm longae et ca. 0.23 mm latae apice breviter acutae extus glabrae; scapi stylorum in partibus hispidulis superioribus ca. 1.5 mm longi. Achaenia ca. 1.5 mm longa dense longe setifera; setae pappi persistentes 25-30 plerumque 6.0-6.5 mm longae apice leniter latiores margine dense scabridulae extus sparse scabridulae, squamae exteriores anguste lineares ca. 1.5 mm longae apice anguste acutae margine scabridae extus sparse scabridae. Grana pollinis leniter oblata ca. 50 μ m alta et 55 μ m lata valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Goiás: Chapada dos Veadeiros, ca. 25 km N of Alto do Paraíso, ca. 1250 m elev. Cerrado. Campo and cerrado on outcrops. Herb to ca. 1 m tall. Heads lilac. 22 March 1971. *H.S. Irwin, R.M. Harley & G.L. Smith 32990* (Holotype, UB; isotype, US). PARATYPE: BRASIL: Goiás: Chapada dos Veadeiros, 14°S, 47°W, ca. 20 km W of Veadeiros. Elev. 1000 m. Creek margin, among rocks. Subshrub ca. 1 m tall. Heads magenta. 9 Feb. 1966. *H.S. Irwin, J.W. Grear, Jr., R. Souza & R. Reis dos Santos 12441* (US).

In the densely pubescent involucre, *V. souzae* seems most similar to such species as *V. floccosa* Gardn., *V. lacunosa* Mart. and *V. vestita* Baker. The new species is initially distinguishable from all of these by the oblong to oblanceolate leaves with rounded tips. The latter two species differ further by having a rugulose upper leaf surface and having only 8-10 flowers by head. The totally glabrescent upper leaf surfaces, the large ovate lower leaves, the smaller upper inflorescence bracts, and the more densely branched rather thyrsoid inflorescence easily distinguish *V. floccosa*.

The new species has the upper surfaces of the leaves mostly covered with a dense felt, but one older leaf shows a glabrescent condition, and the veinlets of the upper surface can be seen to be prominulous. The long setae on the tips of the corolla lobes consist mostly of a single moderately thick-walled apical cell.

VERNONIA SUBCARDUOIDES H. Robinson, sp. nov.

Plantae herbaceae perennes erectae ad 50 cm altae supra basem non ramosae. Caules rubescentes teretes leniter striati superne sparse villosi. Folia alterna subsessilia, petiolis ca.

1-2 mm longis; laminae herbaceae anguste oblongae vel oblongo-lanceolatae plerumque 3.5-8.0 cm longae et 0.7-1.1 cm latae base acutae margine integrae anguste indistincte recurvatae apice acutae supra lucidae persparse tenuiter pilosae subtus plerumque glabrae dense glandulo-punctatae, nervis et nervulis utrinque prominulis, nervis primariis subtus sparse tenuiter pilosis, nervis secundariis paucis utrinque ca. 4-5 brevibus erecto-patentibus. Inflorescentiae terminales non ramosae serialiter cymosae paucae capitatae, internodis dense villosis vel hirsutis, bracteis foliiformibus lanceolatis 2.5-3.5 cm longis et 0.6-0.9 cm latis, capitulis ex axillis bractearum long pedunculatis, pedunculis 1-3 cm longis dense villosis vel hirsutis. Capitula late campanulata 15-17 mm alta et 10-14 mm lata; squamae involucris coriaceae ca. 110 subimbricatae 5-6-seriatae inferiores patentes lanceolatae vel lineari-lanceolatae 4-14 mm longae et 1.0-1.5 mm latae apice minute apiculatae margine dense denticulatae superne margine et extus sublepidotae vel dense pilosae. Flores ca. 20? in capitulo. Corollae lavandulae in textura subtenuis ca. 12-13 mm longae, tubis anguste infundibularibus ca. 6.5 mm longis extus glabris, faucibus ca. 2 mm longis glabris, lobis anguste oblongis 3.5-4.0 mm longis et ca. 0.7 mm latis inferne glabris subapice dense glanduliferis; thecae antherarum ca. 4 mm longae; appendices antherarum oblongo-ovatae ca. 0.35 mm longae et 0.2 mm latae apice anguste rotundatae extus glabrae; nodi stylorum indistincti vel nulli; scapi stylorum in partibus hispidulis superioribus ca. 1.2 mm longi. Achaenia ca. 1.8-2.0 mm longa perdense setifera; setae pappi sordidae ca. 28 plerumque 8.5-9.0 mm longae apice non latiores interdum distinctae tenuiores margine et extus argute scabridulae, series exteriores setiformes ca. 1 mm longae indistincte scabridae. Grana pollinis distincte oblata ca. 50 μ m alta et 65 μ m lata valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. argyrophylla*-Type).

TYPE: BRASIL: Minas Gerais: Serra do Espinhaço, ca. 3 km N of São João da Chapada. Elev. 1200 m. Cerrado. Campo, cerrado on outcrops, and wooded valley. Herb to ca. 50 cm tall. Heads lilac. 24 March 1970. *H.S. Irwin, S.F. da Fonseca, R. Souza, R. Reis dos Santos & J. Ramos 28237* (Holotype, UB).

The flattened, lanceolate, denticulate involucrel bracts of the new species are most like those of *V. carduoides* Baker, but they are much more coriaceous with scarcely thinner margins. Also, the margins are straight with rather regularly disposed teeth, while the margins are thinner and minutely lacinate in *V. carduoides*. The leaves of the new species are also broader, flatter, and more glabrous, with large dark glandular punctations on the under surface. The younger involucrel bracts of the new species retain a thin web of hairs distally, with some hairs present on the older bracts, but the involucre of *V. carduoides* shows few or no hairs at anthesis. The longer peduncles of the heads of the new species are also distinctive.

VERNONIA TOMBADORENSIS H. Robinson, sp. nov.

Plantae fruticulosae ca. 1.5 mm altae mediocriter ramosae. Caules pentagonales inferne teretes striati canescentiter appresse breviter pubescentes, pilis sub-T-formibus sessilibus apice acutis. Folia alterna sessilia; laminae lineares plerumque 3-7 cm longae et 0.2-0.4 cm latae base vix petioliformes margine integrae apice anguste obtusae supra et subtus canescentiter appresse pubescentes et dense glandulo-punctatae, nervis secundariis brevibus valde ascendentibus. Inflorescentiae terminales mediocriter ramosae, ramis serialiter cymosis in nodis vix vel non deflectis dense appresse puberulis, bracteis foliiformibus plerumque 2.5-3.5 cm longis et ca. 2 mm latis. Capitula in seriebus solitaria sessilia vel subsessilia axillares vel parum extra-axillares campanulata ca. 16 mm alta et 10 mm lata; squamae involucri ca. 60 subimbricatae ca. 6-seriatae appressae oblongae vel anguste oblongae 0.7-9.0 mm longae et 0.5-1.5 mm latae apice plerumque subtruncatae et abrupte apiculatae margine anguste scariosae saepe rubro-tinctae extus villosae et obscure glandulo-punctatae ad medio plerumque late viridi-vittatae. Flores ca. 17 in capitulo. Corollae lavandulae 10-11 mm longae, tubis anguste unfundibularibus ca. 6 mm longis extus glabris, faucibus ca. 1.5 mm longis glabris, lobis anguste oblongis 3.0-3.5 mm longis et ca. 0.6-0.7 mm latis superne dense pilosis et glandulo-punctatis; thecae antherarum ca. 3.5 mm longae; appendices antherarum oblongo-lanceolatae ca. 0.5 mm longae et 0.3 mm latae apice anguste rotundatae extus glabrae; scapi stylorum in partibus hispidulis superioribus ca. 0.5 mm longi. Achaenia ca. 2.5 mm longa dense sericeo-setifera et multo breviter glandulifera; setae pappi persistentes 40-45 plerumque 6.0-6.5 mm longae apice leniter latiores margine ad apicem et extus perdense scabridulae ceterum margine mediocriter scabridulae extus sparsius scabridulae, squamae exteriores lineares ad 2 mm longae et ad 0.15 mm latae extus sparse scabridulae. Grana pollinis in diametro ca. 55-60 μ m valde lophorata, cristis altis minute multo spinuliferis, spinis majoribus nullis (reticulation *V. arenaria*-Type).

TYPE: BRASIL: Bahia: Serra do Tombador, ca. 22 km W of Morro do Chapéu, elev. ca. 1000 m. Caatinga scrub on sand with sandstone outcrops. Shrub ca. 1.5 m tall. Heads pinkish lavender. 20 Feb. 1971. *H.S. Irwin, R.M. Harley & G.L. Smith* 32642 (Holotype, UB; isotype NY).

On the basis of the pollen and the pubescence with sub-T-formed hairs, the new species is related to *V. arenaria* Mart. of nearby Piauí and *V. pinheiroi* n.sp., also of the Serra do Tombador. The narrowly linear leaves of *V. tombadorensis* readily distinguish the species from others of the group. The short-tipped involucre bracts are also distinctive.

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ASTERACEAE of BAHIA, BRAZIL

Vernonia alvimii H. Robinson, *Nov. Act. Bot. Hort. Bot. Univ. Coimbra* 1979

No.

1979

Município de Santa Cruz do Capela, Estado de Bahia, Serra do Sincora, 1.500 metros, 1979.

Robinson, M. King, Scott, A. M., A. M. 1979, 1979.

A. C. 1979, 1979.

Vernonia alvimii H. Robinson, *Nov. Act. Bot. Hort. Bot. Univ. Coimbra* 1979.

Vernonia alvimii H. Robinson, Holotype, Jardim Botânico, Rio de Janeiro. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



2569311

Vernonia angulata H. Robinson
Holotype

THE NEW YORK BOTANICAL GARDEN
Plants of the Planalto do Brasil

Estado de Goiás
No. 17793 SERRA DO CATAM

Vernonia scabra Pers.
Det. G. M. Barroso 1966

Subshrub ca. 1 m. tall. Heads white.
wet slope, ca. 40 km. S. of Calasponia,
road to Jataí. Elevation 950 m.

H. S. Irwin, R. Sousa da M. Green,
R. Reis dos Santos 26 June 1966

Field work conducted with the collaboration of the Universidade de Brasília,
Instituto Agrônomo de Roraima, and the Ministério da Agricultura. Supported in
part by funds from the National Science Foundation

Vernonia angulata H. Robinson, Holotype, United States
National Herbarium.

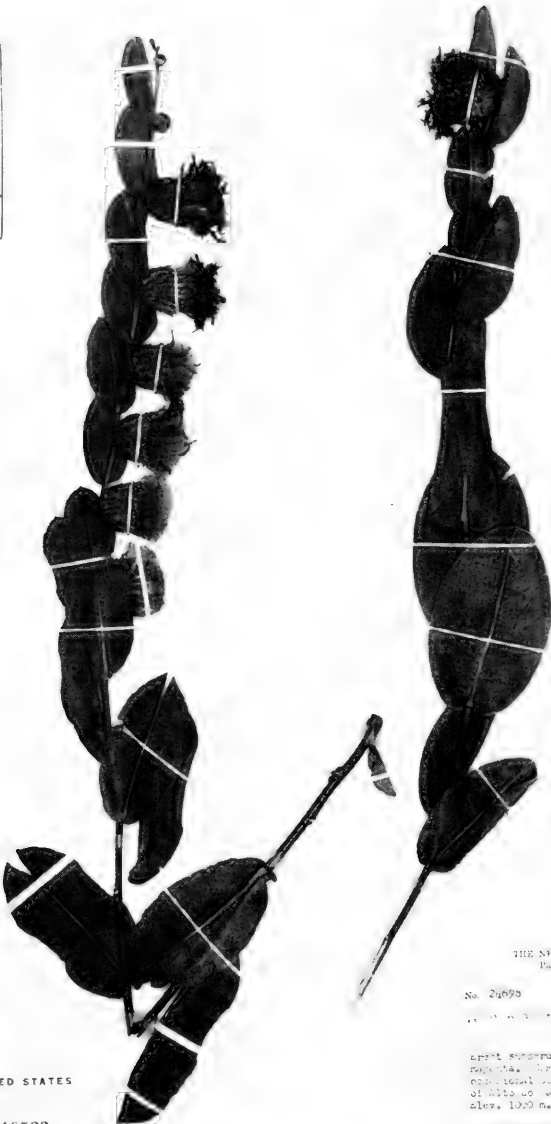


Vernonia cristalinae H. Robinson, Holotype, Herbário
Universidade de Brasília.



Vernonia echinocephala H. Robinson, Holotype, Herbário
Universidade de Brasília.

Vernonia echinocephala H. Robinson, Holotype, Herbário
Universidade de Brasília.



UNITED STATES

2518523

NATIONAL HERBARIUM

THE NEW YORK BOTANICAL GARDEN
Herbarium of the University of the State of New York
New York City

No. 24693

Small specimen of *Vernonia fonsecae*. Heads
small. Leaves on stem slopes with
occasional lobes, on stem south
of Alto do Galvão (formerly Andaraes),
elev. 1000 m.

H. S. Gentry, R. B. & C. Gentry, 23 March 1962
L. A. & P. O. Gentry
P. O. Gentry, R. B. & C. Gentry, 23 March 1962
P. O. Gentry, R. B. & C. Gentry, 23 March 1962

Vernonia fonsecae H. Robinson, Holotype, United States
National Herbarium.

1980

Robinson, Additions to *Vernonia*

195



UB
Herb. Univ. Bras.
Det. B. H.

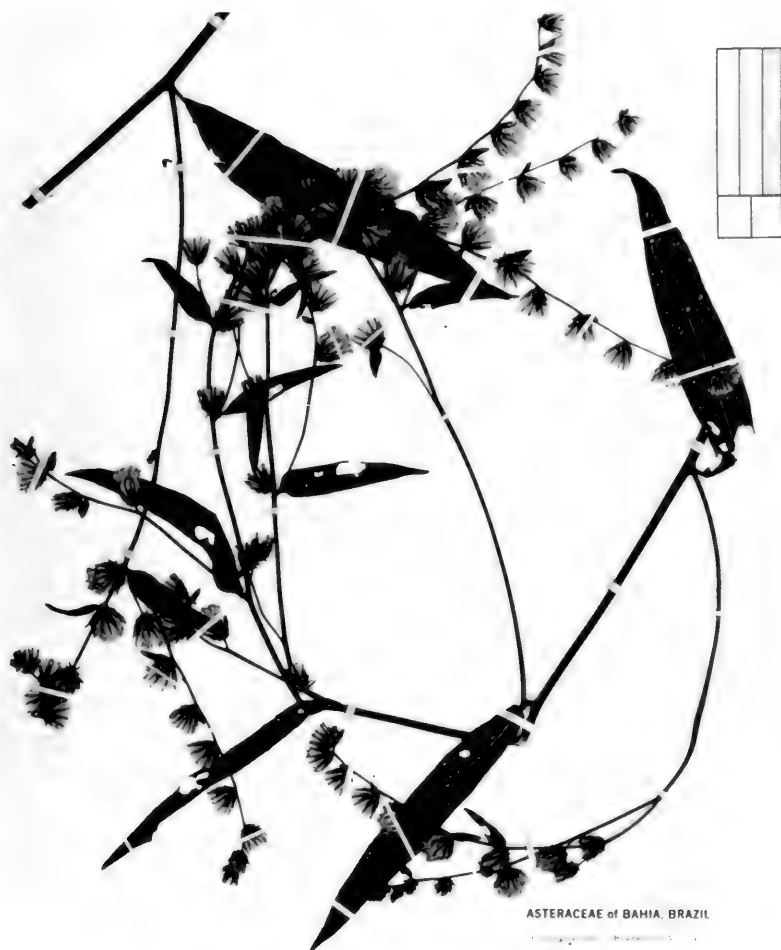


HERBÁRIO NACIONAL
BRASILIA
N.º 1980
Vernonia sp. nov.
Desenho de H. Robinson
1980

Vernonia grearii H. Robinson, Holotype, Herbário Universidade de Brasília.



Vernonia piresii H. Robinson, Holotype, Herbário Universidade de Brasília.



ASTERACEAE of BAHIA, BRAZIL

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

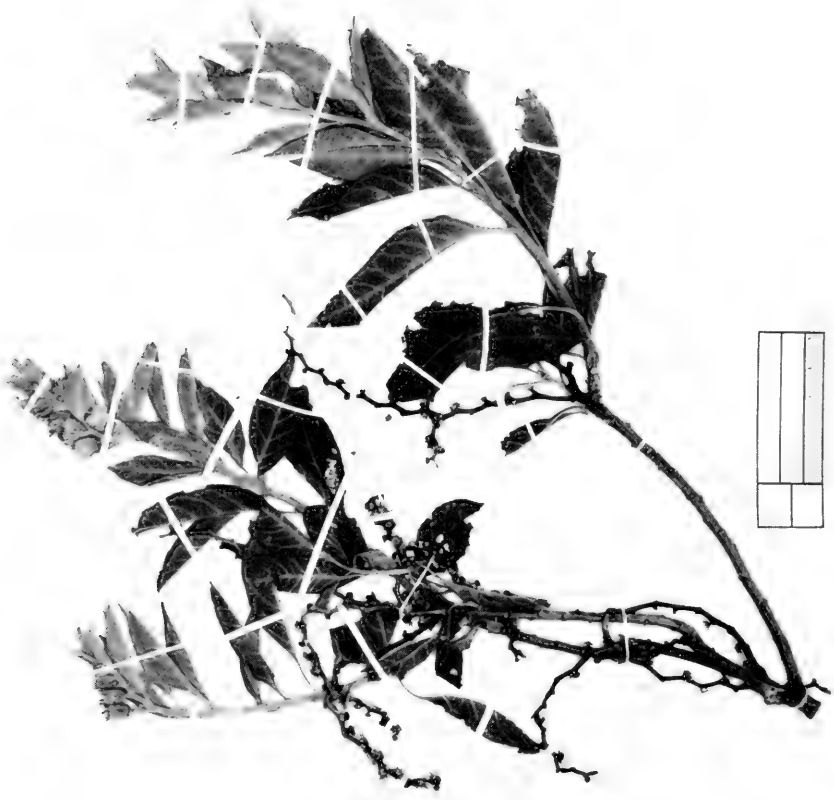
Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, *Nov. Act. Bot. Hort. Botanic. Berol.* 1980, 10: 100, fig. 100.

Vernonia hagei H. Robinson, Holotype, Jardim Botânico, Rio de Janeiro.



isotype

IN HERBARIUM K. RENZI
BRAZIL - ESTADO DA BAHIA
C. A. AGUIAR

2851611

NATIONAL HERBARIUM

R. M. HARLEY, ST. MATO, RAL. ST. PR. T. S. SANTOS, & R. S. PRODRON
Harley No. 196-8

Leafy stem of Vernonia pinheiroi, from the Jardim Botânico, Rio de Janeiro, and the Academia Brasileira de Ciências, Rio de Janeiro, Brazil. (Continuation of the series of specimens of Vernonia pinheiroi, H. Robinson, isotype, United States National Herbarium.)

Vernonia pinheiroi H. Robinson, Isotype, United States National Herbarium.



UNITED STATES

2815715

NATIONAL HERBARIUM

Vernonia pseudopiptocarpa H. Robinson, Holotype, United States National Herbarium.



ASTERACEAE of BAHIA, BRAZIL



ASTERACEAE of BAHIA, BRAZIL

Vernonia santosii H. Robinson, Holotype, Jardim Botânico,
Rio de Janeiro.



UNITED STATES

2818677

NATIONAL HERBARIUM

THE NEW YORK BOTANICAL GARDEN
Herbarium of the University of the City of New York
No. 255

Vernonia soderstromii H. Robinson
Holotype, United States
National Herbarium
No. 2818677
1937

Herbarium of the University of the City of New York
H. S. Gentry, Director

Vernonia soderstromii H. Robinson, Holotype, United States National Herbarium.



THE NEW YORK BOTANICAL GARDEN
Herbarium of the University of the State of New York

No. 32990 Chapada dos Veadeiros

Vernonia souzai H. R.

to ca. 1 m tall. Heads lilac. Vernonia.
Campo and cerrado on outcrops, ca. 1500 m.
N. of Alto do Paraíso, Co. Goiás, elev.

H. R. & W. B. M. Hervey, G. L. Smith 22 March

Plant freely material with the permission of the Universidade de Brasília.
The University of the State of New York Botanical Garden, New York, 1980.
Part of funds from the National Science Foundation.

Vernonia souzai H. Robinson, Holotype, Herbário Universidade de Brasília.



THE NEW YORK BOTANICAL GARDEN
Plants of the Flacundo do Brasil

Estado de Minas Gerais
Município de Leopoldina

No. 2425

herb to ca. 50cm tall. heads lilac. Cerrado.
Jambo, cerrado on outcrops, and wooded
valley, ca. 1km N. of São João da Boa Vista.
elev. 1200m.

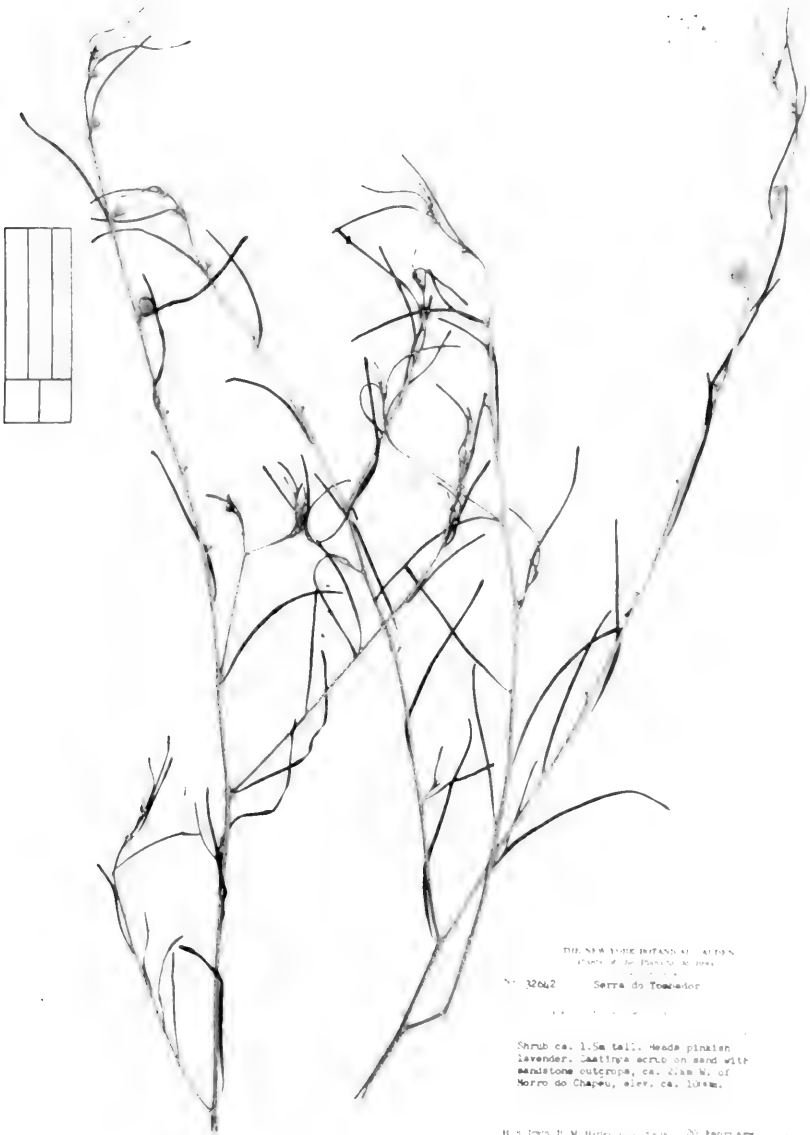
H. S. Irwin, S. F. da Fonseca,
R. Sousa, R. dos Santos,
J. Ramos

1970

Plant material deposited with the herbarium of the Universidade de Brasília and
the Institute of Botany, Universidade de São Paulo. Herbarium material deposited in
1970 by funds from the National Science Foundation.



Vernonia subcarduoides H. Robinson, Holotype, Herbário
Universidade de Brasília.



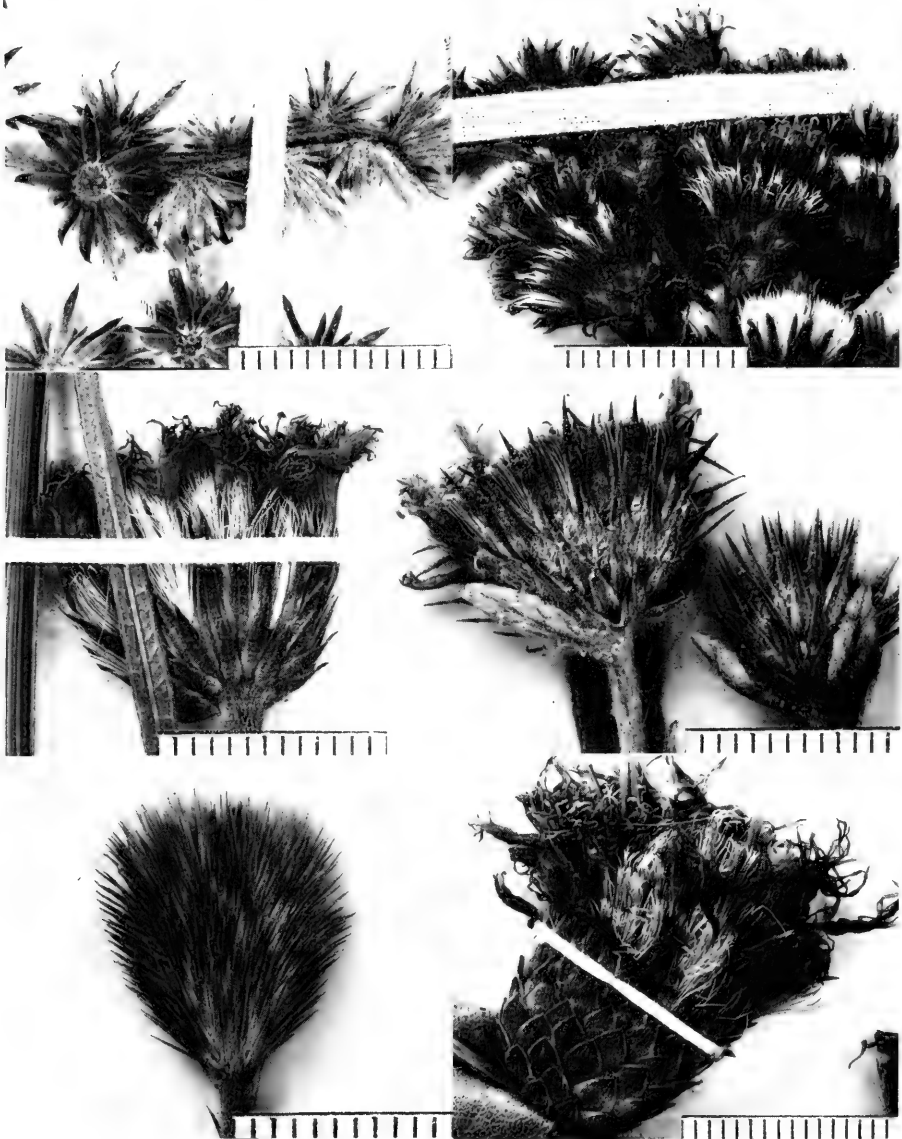
THE NEW YORK BOTANICAL GARDEN
 Herbarium of the University of the State of New York

No. 32042 Serra do Tombador

Shrub ca. 1.5m tall. Heads pinkish
 lavender. Caustic acrid on sand with
 sandstone outcrops, ca. 2000 m. of
 Morro do Chapéu, elev. ca. 1000m.

Herb. from H. M. Robinson, 20 February 1980.
 The material is deposited in the Herbarium of the University of the State of New York.

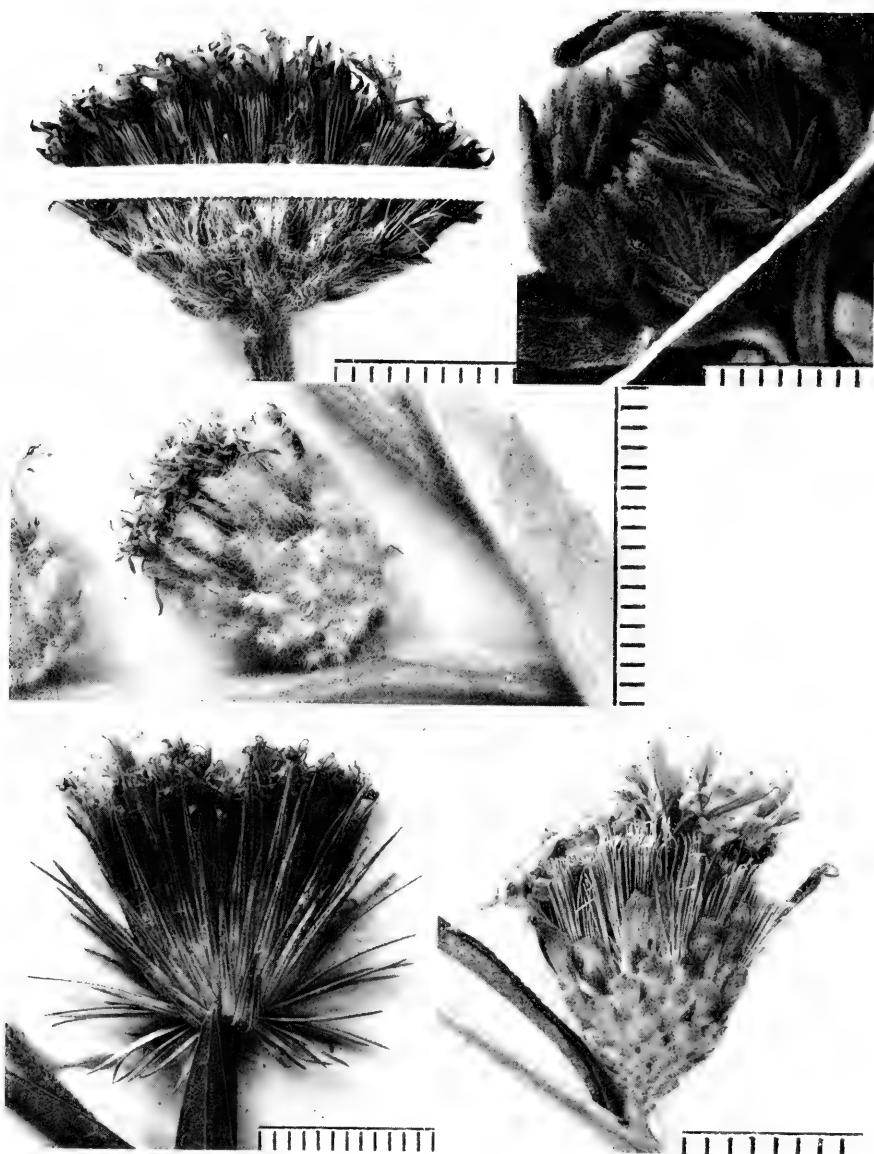
Vernonia tombadorensis H. Robinson, Holotype, Herbário
 Universidade de Brasília.



Enlargements of heads of *Vernonia*. Top. *V. alvimii*, *V. angulata*. Middle. *V. caiapoensis*, *V. cristalinae*. Bottom. *V. echinocephala*, *V. fonsecae*.



Enlargements of heads of *Vernonia*. Top. *V. grandis*, *V. hagei*. Middle. *V. pinheiroi*, *V. piresii*. Bottom. *V. pseudo-piptocarpha*, *V. regia*.



Enlargements of heads of *Vernonia*. Top. *V. santosii*, *V. soderstromii*. Middle. *V. souzae*. Bottom. *V. subcarduoides*, *V. tombadorensis* (from Isotype, NY).

NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXIV

Harold N. Moldenke

SYNGONANTHUS PHILODICOIDES var. *MORII* Mold., var. nov.

Haec varietas a forma typica speciei recedit foliis glabris ca. 4 cm. longis, pedunculis glabris, et vaginis glabris.

This variety differs from the typical form of the species in having its leaves, sheaths, and peduncles glabrous and the leaves about 4 cm. in length

The variety is based on *S. A. Mori*, *R. M. King*, *T. S. dos Santos*, & *J. L. Hage* no. 12641, collected in the vegetation along the margins of a stream in campo rupestre, at 1000 m. altitude, 3 km. south of Mucujê, along the road to Jussiape, 13°00' S., 41°24' W., Municipality of Mucujê, Bahia, Brazil, on July 26, 1979.

SYNGONANTHUS SIMILIS var. *VENEZUELENSIS* Mold., var. nov.

Haec varietas a forma typica speciei foliis usque ad 4 cm. longis glabris pedunculis glabris recedit.

This variety differs from the typical form of the species chiefly in having the leaves to 4 cm. long and glabrous and the peduncles glabrous.

The variety is based on *Otto Huber* 1633, collected on flat land partially inundated during the wet season, but dry at the time of collection, in the "cabecera del Caño Cotua hasta el pié occidental del Cerro Yapacana". 66°50' W., 3°40' N., Department of Atabapo, Amazonas, Venezuela, and deposited in my personal herbarium. The collector notes that the plant is an herb 40 cm. tall, with pale-gray flower-heads, rather frequent in the type locality. He collected it between February 14 and 28, 1978.

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ADDITIONAL NOTES ON THE GENUS *CONGEA*. I

Harold N. Moldenke

CONGEA Roxb.

Additional & emended bibliography: Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1136, 1159--1160, & 1254. 1876; C. B. Clarke in Hook. f., Fl. Brit. India 4: 561 & 601--604. 1885; T. Cooke, Fl. Presid. Bombay, imp. 1, 2: 438. 1906; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 100--101, 161, & X. 1921; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 99. 1921; T. Cooke, Fl. Presid. Bombay, imp. 2, 2: 518 & 600. 1958; Munir, Gard. Bull. Singapore 21: 315, 316, 333, 334, 336, 338, 340, 349, 351, 352, & 363. 1966; T. Cooke, Fl. Presid. Bombay, imp. 3, 2: 518

& 600. 1967; Mold., *Phytologia* 25: 242--243, 505, & 510. 1973; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 42, 44, 46, 48, & 55. 1978; Mold., *Phytologia* 45: 47--62. 1980.

CONGEA FORBESII King & Gamble

Additional bibliography: Bakh. in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 101 & X. 1921; Mold., *Phytologia* 45: 56--57 & 59. 1980.

CONGEA GRIFFITHIANA Munir

Additional synonymy: *Congea tomentosa* Cooke ex Bakh. in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 101 & X, in syn. 1921 [not *C. tomentosa* Hall. f., 1947, nor King & Gamble, 1959, nor R. & B., 1980, nor Roxb., 1819, nor Roxb. sec. Dop. 1966, nor Roxb. sec. Fletcher, 1966, nor Roxb. sec. Wight, 1960, nor Roxb. sensu King & Gamble, 1966].

Additional & emended bibliography: Bakh. in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 100, 101, & X. 1921; Mold., *Phytologia* 45: 52 & 56--61. 1980.

CONGEA GRIFFITHIANA var. *ELLIPTICA* Munir

Synonymy: *Congea velutina* var. *elliptica* [Munir], *Biol. Abstr.* 48: 5018, sphalm. 1967.

Additional bibliography: [Munir], *Biol. Abstr.* 48: 5018. 1967; Mold., *Phytologia* 45: 60. 1980.

CONGEA SIAMENSIS Fletcher

Additional bibliography: Mold., *Phytologia* 45: 62. 1980.

Recent collectors have described this species as a trailer or climber, the involucre united for 4 mm., and the bracts pink-magenta in color. They have encountered it in evergreen and in mixed bamboo forests, in open spaces at the edges of evergreen forests, and on rough limestone hills, at 170--200 m. altitude, flowering from December to February. Parker calls it "common" in Burma, while Bunkhramy refers to it as "not common" in Thailand. The "flowers" [corollas? bracts?] are said to have been "purple" on Bunkhramy 7.

Munir (1966) cites BaPe 804, *Bot. Surv.* 379, and Parker 2161 & 2393 from Burma and Boonkrong 7, Kerr 10166 & 19792, Larsen 8723 & 9167, Marcan 2529, Phengkhilai 175, Sangkhachand 757, and Smith 314 from Thailand.

Material has been misidentified and distributed in some herbaria as *C. tomentosa* Roxb. On the other hand, the Cheviwat & Nimanong 21, distributed as *C. siamensis*, actually is *C. tomentosa* Roxb., while Herb. Roy. Forest Dept. 29432 and Phengkhilai 554 are *C. tomentosa* var. *nivea* Munir.

Citations: BURMA: R. N. Parker 2393 (Ca--320618, Z). THAILAND: Bunkhramy 7 [Herb. Roy. Forest. Dept. 26223] (S); K. Larsen 8723 (S), 8740 (Cp), 9167 (Z); H. M. Smith 314 (W--1274120).

CONGEA TOMENTOSA Roxb., *Pl. Coromand.* 3: 90, pl. 293. 1819 [not *C. tomentosa* Cooke, 1921, nor Hall. f., 1947, nor King & Gamble,

1959, nor Roxb. sec. Dop, 1966, nor Roxb. sec. Fletcher, 1966, nor Roxb. sec. Wight, 1960, nor Roxb. sensu King & Gamble, 1966].

Synonymy: *Congea azurea* Wall., Numer. List [47], no. 1733/1, hyponym. 1829; Walp., Repert. Bot. Syst. 4: 116. 1845. *Congea azurea* var. *latifolia* Wall., Numer. List [47], no. 1733/2, hyponym. 1829. *Roscoea tomentosa* Roxb., Fl. Ind., ed. 2, imp. 1 [Carey], 3: 56--57. 1832. *Roscoea villosa* Roxb., Fl. Ind., ed. 2, imp. 1 [Carey], 3: 55--56. 1832. *Calochlamys capitata* Presl, Bot. Bemerk. 149. 1844. *Congea tomentosa* β *oblongifolia* Schau. in A. DC., Prodr. 11: 624. 1847. *Congea tomentosa* α *latifolia* Schau. in A. DC., Prodr. 11: 624. 1847. *Roscoea villosa* Roxb. ex Schau. in A. DC., Prodr. 11: 624, in syn. 1847. *Congea tomentosa* var. *azurea* (Wall.) C. B. Clarke in Hook. f., Fl. Brit. India 4: 604. 1885. *Congea tomentosa* var. *oblongifolia* Schau. ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 604. 1885. *Congea villosa* (Roxb.) Wight ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 603. 1885 [not *C. villosa* "(Roxb.) Wight" apud Munir, 1966, nor Wight, 1966]. *Congea azurea* Woodr., Gard. India, ed. 5, 420, sphalm. 1889. *Congea villosa* Wight ex Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893. *Congea tomentosa* var. *coerulea* (Griff.) Clarke ex Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 181, nom. nud. 1895. *Congea tomentosa* var. *azurea* Clarke ex Gamble, Man. Indian Timb., ed. 2, imp. 1, 545. 1902. *Congea tomentosa* var. *azurea* "Wall. Clarke" ex Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: X, sphalm. 1921. *Congea tomentosa* Roxb. ex Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 100, in syn. 1921. *Congea tomentosa* var. *azurea* (Wall. ex Wight) C. B. Clarke ex Fletcher, Kew Bull. Misc. Inf. 1938: 440. 1939. *Congea villosa* (Roxb.) Wight ex Mold., Alph. List Inv. Names Suppl. 1: 8, in syn. 1947. *Congea tomentosa* var. *caerulea* (Griff.) Clarke ex Mold., Résumé 275, in syn. 1959. *Congea tomentosa* var. *caerulea* (Wall.) Clarke ex Munir, Gard. Bull. Singapore 21: 305, in syn. 1966. *Congea tomentosa* var. *tomentosa* [Roxb.] ex Munir, Gard. Bull. Singapore 21: 305. 1966. *Congea tomentosa* var. *azurea* (Wall. ex Walp.) Clarke ex Mold., Résumé Suppl. 15: 20, in syn. 1967. *Congea azurea* Vahl ex Mold., Phytologia 36: 42, in syn. 1977. *Congea tomentosa* var. β Schau. ex Mold., Phytologia 36: 42, in syn. 1977. *Congea tomentosa* R. & B. ex Mold., Phytologia 45: 210, in syn. 1980.

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Fl. Brit. India 4: 603--604. 1885; Watt, Dict. Econ. Prod. India 2: 517. 1889; Woodr., Gard. India, ed. 5, 420. 1889; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 179--181. 1895; J. J. Sm., *Teysmannia* 10: 366--368. 1899; Gamble, Man. Indian Timb., ed. 2, imp. 1, 545. 1902; Prain, Bengal Pl., imp. 1, 1: 838. 1903; Knuth, Handb. Blütenbiol. 3 (2): 78. 1905; Williams, Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Brandis, Indian Trees, imp. 1, 513. 1906; T. Cooke, Fl. Presid. Bombay, imp. 1, 2: 438. 1906; D. D. Cunningham, Plagues Pleas. Beng. pl. 29. 1907; King & Gamble, Journ. Asiat. Soc. Beng. 74 (3 extra): 865--866. 1908; Soler., Syst. Anat. Dicot. Ergänz. 254. 1908; Woodrow, Gard. Trop., ed. 6, 441. 1910; Craib, Kew Bull. Misc. Inf. 1911: 445. 1911; Duthie, Fl. Upper Gang. Plain 2: 229. 1911; Craib, Contrib. Fl. Siam Dicot. 167. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 7: 332 & 350. 1913; H. F. MacMill., Trop. Agric. 40: 20. 1913; H. F. MacMill., Gard. Chron., ser. 3, 54: 399, fig. 138. 1913; H. F. MacMill., Trop. Agric. 46: 262. 1916; H. Hallier, Meded. Rijks Herb. Leid. 37: 86--87. 1918; H. J. Lam, Verb. Malay. Arch. 335, 337--339, & 365. 1919; Ridl., Journ. Fed. Malay States Mus. 10: 111. 1920; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 100--101 & X. 1921; Gamble, Man. Indian Timb., ed. 2, imp. 2, 545. 1922; Ridl., Fl. Malay Penins. 2: 640. 1923; Gamble, Fl. Presid. Madras 6: 1106. 1924; Boynton, Addisonia 13: pl. 426. 1928; Cat. Quint. Perez Estr. San Pedro Sula 28. 1935; R. W. R. Mill., Gard. Book Barbados 84 & iii. 1935; Dop in Lecomte, Fl. Gén. Indo-chine 4: 908, 911, & 913. 1936; Navarro Haydon, Fl. Comun. Puerto Rico 10. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 439 & 440. 1938; Standl., Field Mus. Publ. Bot. 18: 1004. 1938; Mold., Annot. List 108. 1939; Mold., Suppl. List Comm. Names 11 & 21. 1940; Worsdell, Ind. Lond. Suppl. 1: 248. 1941; Mold., Alph. List Inv. Names 22. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 22, 54, 55, 57, 59--61, 73, & 92. 1942; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 1, 120. 1942; Mold., Phytologia 2: 102. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595. 1946; H. F. Mac Mill., Trop. Plant. Gard., ed. 5, imp. 2, 120. 1946; Mold., Phytologia 2: 312. 1947; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 3, 1]0 (1948) and ed. 5, imp. 4, 120. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 39, 59, 124, 126, 129, 136--138, 160, & 173. 1949; W. L. Phillips, Cat. Pl. Fairchild Trop. Gard. 17 & 50. 1949; D. V. Cowen, Flow. Trees Shrubs India 119. 1950; Menninger, 1950-1951 Offer. 300 Diff. Flow. Trop. Trees [4]. 1950; Metcalfe & Chalk, Anat. Dicot. 1037. 1950; Erdtman, Pollen Morph. Pl. Tax., ed. 1, 448. 1952; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 5, 120. 1952; Steiner, Philip. Orn. Pl. 148. 1952; Roig, Dicc. Bot. 2: 599 & 1009. 1953; Sawarantari & Misra, Sci. Culture 18 (8): 388--389. 1953; Bor & Raizada, Some Beaut. Indian Clim. 140 & 282, fig. 89. 1954; H. F. MacMill., Trop. Plant Gard., ed. 5, imp. 6, 120. 1956; T. Cooke, Fl. Presid. Bombay, imp. 2, 2: 518 & 600. 1958; Menninger, 1959 Price List [6]. 1958; Anon., Kew Bull. Gen. Index 82. 1959; Mold., Résumé 46, 66, 159, 161, 165, 175, 177, 179, 217, 248, 275, 343, & 439. 1959; Mold., Résumé Sup-

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It is of interest to note that Jackson (1893) and Lam (1919) regarded *C. azurea* Wall. as a synonym of *Sphenodesme pentandra* Jack. It should also be noted here that the Boynton (1928) reference in the bibliography (above) is cited by Worsdell (1941) as "1927", but actually was not published until July 11, 1928.

Recent collectors describe *Congea tomentosa* as a large, woody, showy, climbing or sprawling vine, to 13 m. long, or as an arching, scandent, or scrambling shrub, 1--5 m. tall, the branches long and pendulous, the leaves grayish-green, the "inflorescence purplish-green", the "involucre purple", the bracts large, showy, light-purple, purple, or reddish-purple, varying to lavender, pale-pink, lavender-white, vinaceous, pink-mauve, "mauve to gray", bright violet-purple, or "light-pink and whitish toward the base", velvety, the calyx-lobes elongate in fruit, the flowers small, frequented by insects, the corolla glabrous or nearly so, the stamens filaments lavender-pink or maroon to purple or red, the style purple, and the stigmas whitish.

Koeltz describes the plant as "a climber with gray felt more or less masked with rose or rose-purple". The "flowers" [involucre?] are said to have been "pink" on *Bunchuai* 807, *Dee* 518, and *Lindhard s.n.*, "dark-pink" on *Dee* 972, "light-pink" on *Hosseus* 370, "pinkish-purple" on *Cheviwat & Nimanong* 21, "red" on *King's Collector s.n.* and *Shaik Mokim* 25, "violet" on *Hosseus* 386x, "light-lilac" on

Hosseus 371, "azure" on *Nur s.n.*, and "purple" on *Valero & Rica V.40*, but [the corollas?] "white" on *Gillis 7564*, *Howard & Nevling 16914*, *C. P. & al. 3041*, *Sheehan R.23*, *Skog 1224*, and *Wagner 762*, "white with purple marks on larger lip" on *Furtado s.n.*, and "white, base of tube maroon" on *Jack 8486*.

Collectors have found this species growing in evergreen forests and in "degenerated mixed deciduous forests with many clearings and bamboo growth", at 200--1665 m. altitude, in flower from January to April, as well as in August, October, and November, in fruit in March. *Nur* asserts that it "flowers all year" in Malaya. *Cheviwat & Nimanong* describe it as a "common climber by swamps in evergreen forests" in Thailand. *Hosseus* refers to it as a "rare tree, 8 m. tall, trunk 20 cm. diam." or as a "scattered tree of beautiful aspect", also in Thailand. It is probable that his reference to it as a tree is an error in observation -- most probably it was a vine climbing on a tree. *Bunchuai* found it "common in mixed deciduous forests", while *Beusekom & Phengkhilai* call it a "common climber in open bamboo forests" and *Dee* refers to it as "common in dry deciduous forests and dry evergreen jungles", also in Thailand. *McMillan* asserts that in Borneo the "plants [are] so numerous that they give a purple color to the landscape". *Lindhard* reports it a "very common liana in the [Thailand] mountains". *MacMillan* (1943) asserts that "The coloured calyxes remain long after the corollas have fallen", obviously referring to the involucre and perhaps also the fruiting calyxes.

Common and vernacular names reported for *C. tomentosa* include "awndaeng", "cocinera", "congea", "dawk awm", "dawl awn", "enredadera santa hoji-rojiza", "japonesa", "ka-yan", "kayaw", "lavender-wreath", "lluvia de orquidas", "lluvia de orquídas", "lluvia de orquideas", "nwezat", "phao prayote", "shower of orchides", "shower of orchids vine", "shower of orchids vine", "shower-of-orchids-vine", "tamakanwe", "terciopelo", "thamaka-nwe", and "woody congea".

The species is reported in cultivation in Sierra Leone by *Gledhill* (1922), in Colombia by *Duque*, in Honduras by *Molina R.* and by the author of the *Cat. Quint. Perez* (1935) work cited in the bibliography (above), in Costa Rica by *Standley* (1938), in Cuba by *Roig* (1953), in Puerto Rico by *Boynton*, in Venezuela by *Lasser, Braun, & Steyermark* (1974), and in India by *Prain* (1903), by *Cooke* (1906), by *Sena & Naskar* (1965), and by *Puri & al.* (1964), as well as by *Voigt* (in Calcutta). *Nielsen* (1965) reports it as introduced in West Africa from "Trop[ical] Asia". The *Liogiers* found it apparently escaped and naturalized in the Dominican Republic. The unnumbered *O'Neill* collection, cited below, was taken from material cultivated in Florida, but introduced there by *N. L. Britton*, probably from Puerto Rico. The *Hummel* collection from Jamaica does not indicate on its accompanying label that it was taken from cultivated material, so it may have come from a naturalized escape.

It is worth noting here that *Hosseus 386x* was labeled "*Congea* n. sp. Hoss." by the collector. It should also be noted that some authors have claimed that the *Roscoeia tomentosa* *Roxb.* of p. 95 of

Roxburgh's "*Hortus Bengalensis*" (1814) is *Conyza tomentosa* Mill. and *R. villosa* Roxb. of the same page is *Laggera aurita* Sch.-Bip., both in the *Carduaceae*. The late N. Y. Sandwith, however, in a letter to me from Kew, dated February 20, 1957, says: "I referred your problem [about this claim] to J. R. Seely, who knows all about Roxburgh....He says: 'We have Roxburgh's illustrations of both *Roscoea tomentosa* R. & *R. villosa* R. The former was published in Roxb. Pl. Coast Coromandel, III. t. 293 as *Congea tomentosa*. The latter is inscribed "*Congea villosa*" by C. B. Clarke. Both are *Congea* spp., not composites. The reduction of *R. tomentosa* to *Conyza tomentosa* is obviously an error through misreading *Congea* as *Conyza*. I cannot suggest an explanation for the reduction of *R. villosa* to *Laggera*. I do not know whether or not there are Roxb. specimens of these spp., but the Roxburgh drawings leave no doubt as to their identity and these drawings are authentic."

It should also be noted here that the *Congea tomentosa* "sec. Dop", referred to in the synonymy (above), is in part *C. pedicellata* Munir and in part *C. vestita* W. Griff; *C. tomentosa* "sec. Fletcher" is *C. tomentosa* var. *nivea* Munir; *C. tomentosa* "sensu King & Gamble" and *C. tomentosa* King & Gamble are *C. griffithiana* Munir; *C. tomentosa* "sec. Wight" is *C. vestita* W. Griff.; and *C. tomentosa* Hall. f. is *C. velutina* Wight; *C. villosa* Wight is *C. griffithiana* Munir and *C. villosa* "(Roxb.) Wight apud Munir" is *C. vestita* W. Griff. The so-called *C. tomentosa* var. *velutina* (Wight) Bakh. is *C. velutina* Wight, while *C. tomentosa* var. *pubescens* Hook. is *Sphenodesme involucrata* var. *pubescens* Mold.

Many authors keep *C. tomentosa* var. *azurea* (Wall.) C. B. Clarke -- based on Wallich 1733/1 from Martaban, collected in 1827 -- as a distinct taxon, characterizing it as having the leaf-blades elliptic, apically acute and more thinly hairy beneath, the bracts oblong or narrowly oblong, and the calyx larger, lobed to 1/2 the way down, the teeth (lobes) broadly lanceolate. The typical form of *C. tomentosa*, on the other hand, is described as having the leaf-blades ovate, softly hairy beneath, the bracts elliptic, and the calyx lobed to only 1/3 the way down. Munir, however, feels that the variety cannot be maintained. The following collections, cited below, may be taken as representing the *azurea* form: Eames s.n., Ekman H. 9963, Friend 88, Helfer 28, Herb. Hort. Bot. Bogor. XV.E.3, XV.E.70, & s.n., Herb. Hort. Bot. Calcut. s.n., Herb. Hort. Tuinherb. s.n., Jack 8486, and Lasser 3466. Briquet (1895) keeps var. *coerulea* (W. Griff.) C. B. Clarke as distinct, but this is probably a mistake for var. *azurea*.

Menninger (1970) tells us that *C. tomentosa* "is the most widespread of the species in the wild state and is also the one most commonly seen in cultivation. It is native from East Pakistan [Bangladesh] and the Assam and Manipur areas of India to Burma, Thailand, Lao, Vietnam, and the Yunnan region of China, probably commonest in Burma....A large well-developed plant may have over 100 panicles and the display is then understandably quite spectacular. The flowering panicles hold well in water after being cut. If gathered early in the flowering season and stored in bundles, base up, until dry, they will keep for many months for use in dry arrangements."

[to be continued]

PHYTOLOGIA

A cooperative nonprofit journal designed to expedite botanical publication

Vol. 45

March 1980

No. 3

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CONTRIBUTION TO THE LICHEN FLORA OF URUGUAY XIII.
LICHENS FROM SIERRA MAHOMA, SAN JOSE DEPARTMENT.

Héctor S. Osorio

Departamento de Botánica, Museo Nacional de
Historia Natural, Montevideo, URUGUAY.

The region known as Sierra Mahoma is situated in the northwestern limit of San Jose Department and is considered one of the most important rocky outcrops in the Southwest of Uruguay. It has a full extent of 10-12 km long and 3 km wide. A complete geomorphological study including its phanerogamic flora and fauna has been already published (Chebataroff 1944).

The present paper is based on samples collected by the author in an area located 4 km northeastwards the Cerro Mahoma, approximately 63°25'W and 37°89'S.

The author regards as a matter of interest to communicate the results obtained because they improve our knowledge on the distribution of members of the austro-brazilian lichen flora in the uruguayan country. The numbers are those of the author and are deposited in his private herbarium.

The author thanks Drs. T. Ahti, J. Hafellner and M. S. Hale, Jr. for the identifications here reported.

Acarospora boliviana Magn.

Top of boulder, not common, 6204.

A. lorentzii (Müll.Arg.) Hue.

Top of boulder, 6196.

Anaptychia casarettiana Mass.

Shaded, S-facing rocks, locally common, 6215.

A. diademata (Tayl.) Kurok.

Rapanea laetevirens trunk, 6150; shaded, S-facing stones, 6179.

A.d. fo. brachyloba (Müll.Arg.) Kurok.

Rapanea laetevirens trunk, 6165.

Caloplaca americana (Malme) Zahlbr.

Stones in a meadow, 6199.

C. cinnabarina (Ach.) Zahlbr.

Top of boulder, locally common, 6194; stone in a meadow, 6198.

- C. crocea (Krep.) Haf. & Poelt.
Rapanea laetevirens trunk, rev. Hafellner, 6163, 6172
C. erythrantha (Tuck.) Zahlbr.
Rapanea laetevirens trunk, 6164.
C. xanthobola (Kremp.) Zahlbr.
Stones near a creek, 6214.
Candelaria fibrosa (Fr.) Müll. Arg.
Celtis tala branches, 6191.
Cladonia aggregata (Sw.) Ach.
Rock crevices, locally common, 6156.
C. didyma (Fée) Vain.
Rock crevices, rare, det. T. Ahti, 6171.
Collema glaucophthalmum Nyl. var. glaucophthamum
Rapanea laetevirens trunk, 6157.a.
C. g. var. implicatum (Nyl.) Degel.
Rapanea laetevirens trunk, 6157.b.
Cora pavonia (Sw.) Fr.
Soil, between stones, 6177.
Everniastrum pachydermum (Hue) Hale
Top of boulder, 6162.
Haematomma montevidense (Räs.) Follm. & Rud.
Rocks, not common, 6208.
Hypotrachyna livida (Tayl.) Hale
S-facing side of boulder, der M. Hale, 6216
H. osorioi (Hale) Hale.
Shaded stones, rev. M. Hale, 6178.
Lecanora atra (Huds.) Ach.
S-facing side of boulder, 6189.
L. farinacea Fée.
Rocks, 6210.
L. fusca Müll. Arg.
Rocks, locally common, 6205.
Lecidea russula Ach.
S-facing side of boulder, 6190; stones in a meadow,
6202.
Leptogium adpressum Nyl.
Rapanea laetevirens trunk, 6158, 6185.
L. phyllocarpum (Pers.) Mont.
Rapanea laetevirens trunk, 6151, 6152 a & b.
L. tuckermanni Dodge
S-facing side of boulder, not common, 6181.
Ochrolechia osorioana Vers.
S-facing side of boulder, 6211.

- O. pallescens (L.) Mass.
Trunk of Myrtaceae, 6160.
- Parmelia hypoleucites Nyl.
Rapanea laetevirens trunk, 6176.
- P. subpraesignis Nyl.
Rapanea laetevirens trunk, det. M. Hale, 6174, 6184.
- Parmelina consors (Nyl.) Hale
Trunk of Myrtaceae, 6153.
- Parmotrema cetratum (Ach.) Hale
Trunk of Myrtaceae, 6161; Blepharocalyx branches, 6169
S-facing side of boulder, det. M. Hale, 6218.
- P. delicatulum (Vain.) Hale
Top of boulder, locally common, 6219 a & b.
- P. reticulatum (Tayl.) Choisy.
Rapanea laetevirens trunk, rev. M. Hale, 6159, 6183;
shaded stones, rev. M. Hale, 6180.
- Peltula euploca (Ach.) Wetm.
Perpendicular irrigated stones, uncommon, 6209.
- Pertusaria colorans Malme var. glebosa (Häs.) Magn.
Stones in a meadow, 6207.
- P. pulchella Malme
Branches of Myrtaceae, 6213.
- Physcia carassensis Vain.
Celtis tala branches, 6193.
- Pseudoparmelia carneopruinata (Zahlbr.) Hale
Shaded stones, 6148.
- P. exornata (Zahlbr.) Hale
Trunk of Myrtaceae, det. M. Hale, 6154; branches of
shrubs, 6195.
- P. papillosa (Lynge ex Gyeln.) Hale
Rocks, rare, 6203.
- P. rupicola (Lynge) Hale
S-facing side of boulder, rare, 6212.
- Pyxine subcinerea Stirt.
Shaded stones, 6175.
- Ramalina celastri (Spreng.) Krog & Swinsc.
Blepharocalyx branches, 6146; wooden fence post, 6166.
- Teloschistes chrysophthalmus (L.) Th. Fr. var.
cinereus Müll. Arg.
- Celtis tala branches, 6192.
- Usnea densirostra Tayl.
Top of boulder, locally common, 6217.a.
- U. dichroa Mot. var. spinulosa Mot.

Blepharocalyx branches, 6149, 6170.

U. pulvinata Fr.

Top and S-facing side of boulder, 6168, 6217.b.
This species, that was involuntarily omitted from the author's Catalogue (Osorio 1972), had been recorded by Motyka (1936/38 pg. 318) for Montevideo as Usnea amblyoclada. Swinscow and Krog (1976) also report it for Uruguay although they do not indicate the locality.

Xanthoparmelia congensis (Stein.) Hale
Rocks in a meadow, 6201.

X. plittii (Gyeln) Hale
Shaded rocks, 6197. New to Uruguay.

SUMMARY

51 taxa collected in Sierra Mahoma, SW Uruguay are listed. Xanthoparmelia plittii is added to the known lichen flora of Uruguay.

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BEGONIA NOMENCLATURE NOTES. 4

The Lectotypification of *Begonia obliqua* Linnaeus
Jack Golding, 47 Clinton Ave., Kearny, N.J. 07032

The Species of the Begoniaceae, edition 2, 1974, by Fred A. Barkley and Jack Golding is a compendium of the published names and the published synonymy for the species and therefore continues the errors from the literature. I have been reviewing the literature to verify or correct the citations and their synonymy. My determinations will be published in this series, "*Begonia* Nomenclature Notes."

INTRODUCTION

The correct identity of *Begonia obliqua* Linnaeus has been very confused in the literature, but by following the principles of typification required by the International Code of Botanical Nomenclature, the name *Begonia obliqua* Linnaeus can be applied only to the Plumier species, *Begonia purpurea, nivea, et rosea, maxima, folio aurito*, the largest, red, white, and rose [flowered] *Begonia*, with eared leaf.

The lectotype for *Begonia obliqua* could be determined only after a thorough study and understanding of Linnaeus and his methods. Fortunately, as a guide, we have the excellent analysis of Linnaeus by William T. Stearn in his introductions to *Species Plantarum* ed. 1 (1753) 1957 reprint, and *Genera Plantarum* ed. 5 (1754) 1960 reprint.

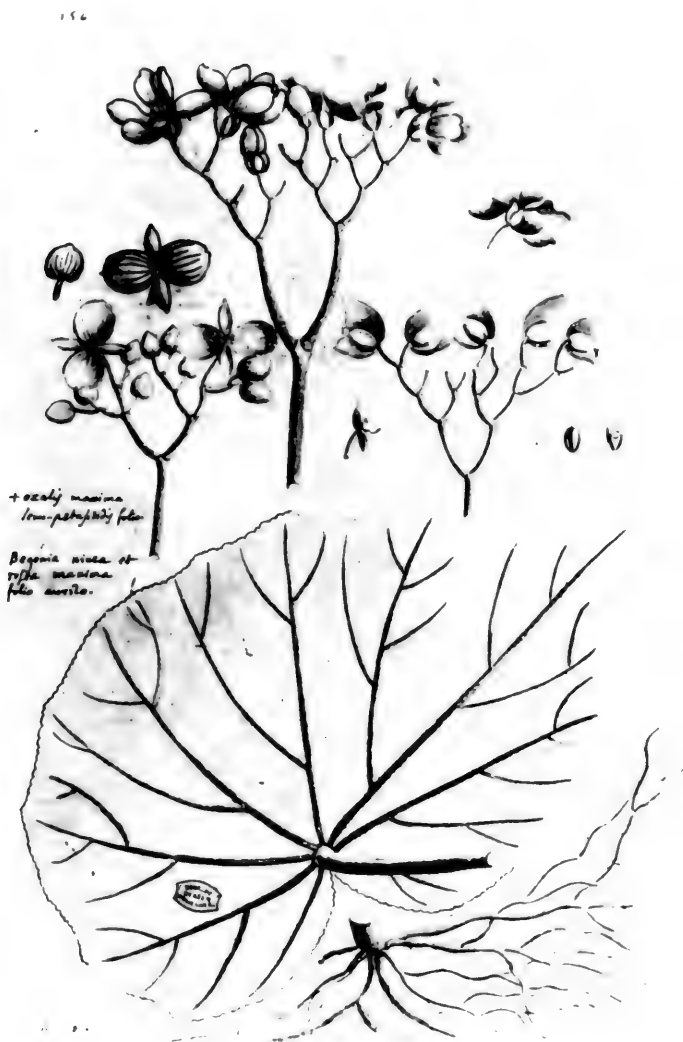
SPECIES PLANTARUM

The start of the search for the lectotype began with the initial citation for the *Begonia obliqua* Linnaeus in *Species Plantarum* ed. 1. 2: 1056. 1753.



Composite of the Plumier drawings *Begonia nivea et rosea maxima, folio aurito* and *Begonia purpurea maxima, folio aurito*.

Figure 1



Begonia nivea et rosea maxima, folio aurito Plumier
mss. "Botanicon Americanum" 3: pl. 6. 1689-97;
Haegeman, *Tuberous Begonia* 15. fig. 7. 1979.
Typotype of
Begonia obliqua Linnaeus, *Species Plantarum* 2: 1056.
1753.

Figure 2



Begonia purpurea maxima, folio aurito Plumier, mss.
 "Botanicon Americanum" 3: pl. 5 fig. 1. 1689-97;
 Haegeman, *Tuberous Begonias* 10. fig. 2. 1979.
 = *Begonia obliqua* Linnaeus, *Species Plantarum* 2: 1056.
 1753.

Figure 3



Begonia purpurea maxima, folio aurito Plumier, mss.
"Botanicon Americanum" 3: pl. 5 fig. 2. 1689-97;
Haegeman, *Tuberous Begonia* 15. fig. 8 1979.
= *Begonia obliqua* Linnaeus, *Species Plantarum* 2: 1056.
1753.

Figure 4

Linnaeus, *Species Plantarum* ed. 1. 2: 1056. 1753.

1056

POLYGAMIA DIOECIA.

BEGONIA.

obliqua

1. BEGONIA.

Begonia nivea maxima, folio aurito. *Plum. spec.* 21.

Aceris fructu herba anomala, flore tetrapetalo albo.

Sloan. jam. 83. *hist.* 1. p. 199. *t.* 127. f. 1. 2.

Begonia purpurea maxima, folio aurito. *Plum. spec.* 20.

β. *Begonia*, roseo flore, folio aurito, minor & glabra.

Plum. spec. 20.

γ. *Begonia*, roseo flore, folio aurito, minor & hirsuta.

Plum. spec. 20.

δ. *Begonia* roseo flore, folio orbiculari. *Plum. spec.* 20.

ε. *Begonia* roseo flore, foliis acutioribus auritis & late crenatis. *Plum. spec.* 20.

ζ. *Begonia* hirsuta, flore albo, folio aurito, fructu crenato. *Barr. equin.* 21.

Habitat in America meridionali.

Folia cordata altero latere oblitterata

Note: Linnaeus copies the phrase name of Barrere incorrectly---, *fructu crenato* should be *fructu coronato*.

Translation

1. *Begonia obliqua*

The largest, white [flowered] *Begonia*, with eared leaf. Plumier, *Catalogus Plantarum Americanarum* 21. 1703.

Irregular [leaved] herb with bitter fruit, with white four-petaled flowers. Sloane, *Catalogus Plantarum Quae in Insula Jamaica* 83. 1691; *Natural History of Jamaica* 1: 199, pl. 127 f. 1 & 2. 1707.

The largest, red [flowered] *Begonia*, with eared leaf. Plumier, *Cat. Pl. Amer.* 20. 1703.

beta - *Begonia* with rose flower, eared leaf, smaller and glabrous. Plumier, *Cat. Pl. Amer.* 20. 1703.

gamma - *Begonia* with rose flower, eared leaf, smaller and hirsute. Plumier, *Cat. Pl. Amer.* 20. 1703.

delta - *Begonia* with rose flower, round leaf. Plumier, *Cat. Pl. Amer.* 20. 1703.

epsilon - *Begonia* with rose flower, leaves more acute and broadly crenate. Plumier, *Cat. Pl. Amer.* 20. 1703.

zeta - *Begonia* with coarse stiff hairs, white flower, eared leaf, fruit crowned. Barrere, Essai sur l'Histoire Naturelle de la France Equiniale. 21. 1741.

It grows in Southern America

Leaf cordate with one of the sides weakly developed.

Following the methods of Linnaeus this format is examined:

Begonia-- the generic name, which is described in *Genera Plantarum* ed. 5. 495. 1754.

The generic name was usually followed by the *nomen specificum legitimum*; i.e., the specific differential character by which Linnaeus identified the individual species. But when he considered a genus to comprise a single species, as he did *Begonia*, it was omitted because he considered the generic character alone sufficient to define it.

The *nomen triviale*, *obliqua*, is inserted in the margin. This is the specific epithet of modern nomenclatural terminology.

The synonymy and literature citations were listed next. For the primary element, he listed two species of Plumier and one from Sloane. Additional synonymy was listed as varieties beta thru zeta; they were the other four species of Plumier and one from Barrere.

The habitat is listed.

Finally he completed the protologue with either a brief description or, as in this case, a diagnostic note which is essentially an amplification of the specific name: *Folia cordata altera latere oblitterato*-- in modern phraseology, obliquely cordate leaf.

Linnaeus made several additions to the *Begonia* citation in *Species Plantarum* ed. 2. 2: 1497-8. 1763. Edition 3 (1764) is merely a reprint.

Linnaeus, *Species Plantarum* ed. 2. 2: 1497-8. 1763.

POLYGAMIA MONOECIA. 1497

BEGONIA.

1. **BEGONIA.** obliqua.
Begonia nivea maxima, folio aurito. *Plum. spec.* 21.
ic. 45 f. 1.
Rumex sylvestris scandens, foliis cordato-angulatis ab
 altera parte majoribus. *Brown jam.* 203.
Aceris fructu herba anomala, flore tetrapetalo albo.
Sloun jam. 83. *hist.* 1. p. 199. t. 127. f. 1. 2.
Begonia purpurea maxima, folio aurito. *Plum. spec.* 20.
B b b b b 5 Empe-

1498 POLYGAMIA MONOECIA.

- Empetrum acetosum*. *Rumph. amb.* 5. p. 457. t. 169.
 f. 2.
 β. *Begonia*, roseo flore, folio aurito, minor & glabra;
Plum. spec. 20. *ic.* 45. f. 3.
 γ. *Begonia*, roseo flore, folio aurito, minor & hirsuta.
Plum. spec. 20. *ic.* 45. f. 2.
 δ. *Begonia* roseo flore, folio orbiculari. *Plum. spec.* 20;
ic. 45.
 ε. *Begonia* roseo flore, foliis acutioribus auritis & late
 crenatis. *Plum. spec.* 20. *ic.* 45. f. 3.
 ζ. *Begonia* hirsuta, flore albo, folio aurito, fructu cren-
 nato. *Barr. equin.* 21.
 .. *Habitat in Indis.* 21.
 * *Folia cordata altero latere oblitterata.*

References to Plumier in Burman, *Plantarum Americanarum* 2: 34. pl. 45 f. 1, 2 & 3 (1756) and the following synonyms were added:

Rumex sylvestris scandens, foliis cordato-angulatis ab altera parte, majoribus Brown, Civil and Natural History of Jamaica 203. 1756. (*Rumex* of the woods climbing, with the leaves cordately angled, with the second part larger.)

Empetrum acetosum Rumphius, *Herbarium Amboinense* 5: 457. pl. 169 f. 2. 1747.

GENERA PLANTARUM

The study of Linnaeus's methods for the compilation of *Genera Plantarum* has shown that many genera have descriptions that have clearly been drawn from a single species and this is true for *Begonia*.

Genera Plantarum ed. 5. 475. 1754.

POLYGAMIA MONOECIA. 475

102.†. BEGONIA.† *Tournef.* 442.

* *Mafculus Flos.*

CAL. nullus: nisi Corollam dicas.

COR. tetrapetala, patens, regularis: *Petala duo opposita lanceolata; duo reliqua* ovata, emarginata, latiora.

STAM. *Filamenta* numerosa, corolla breviora, capillaria. *Antherae* subrotundae.

PER. caducum.

* *Hermaphroditus Flos* in eadem planta cum Mafculis.

CAL. nullus, ejus vices gerit Germen.

COR. *Petala* quinque, obcordata, oblonga, patentia.

STAM. *Filamenta* numerosa, corolla breviora, capillaria. *Antherae* subrotundae.

PIST. *Germen* sub receptaculo, triangulare *angulis* membranaceis, tricuspidatum, erectum. *Styli* tres, bifidi, longitudine flammum. *Stigmata* globosa.

PER. triangulare, triloculare: tribus *alis* longitudinalibus.

SEM. numerosa, parva.

Obs. *De numero flammum, de pericarpii specie* (HM. *baccas comminorae*) *de pistillo mafculi floris, nil certi scimus.*

Hermaphrodito petala quatuor adscribis Rumphius.

Translation

1024 *Begonia* (known from herbarium material) Tournefort,
Institutiones Rei Herbariae 1: 660, p1. 442.
1700.

Male Flower

Calyx - none: only the corolla mentioned.
Corolla - four-petaled, spreading, regular.
two opposite petals lanceolate, the remaining
two ovate, emarginate, wider.
Stamens - filaments numerous, shorter than the
corolla, threadlike. Anthers - almost round.
Pistil - caducous.

Hermaphrodite Flowers, on the same plant with the male.

Calyx - none, instead of which it carries an ovary.
Corolla - petals five, obcordate, oblong, spreading.
Stamen - filaments numerous, shorter than the
corolla, threadlike. Anthers almost round.
Pistil - ovary below the receptacle, triangular,
the angles membranous, with three cusps, erect.
Styles, three, bifid, the same length as the
stamens. Stigma spherical.
Fruit - triangular, three-celled, with three
longitudinal wings.
Seeds - numerous, small.

Observations:

We know nothing with certainty concerning the
number of stamens, the kind of fruit (berries
illustrated in *Hortus Malabaricus*), and the
pistils of the male flowers.

The hermaphrodite flowers with four petals from
the writings of Rumphius.

From this description, it is obvious that Linnaeus
did not understand the true nature of *Begonia* flowers
(monoecious and unisexual) but placed them in his class
Polygamia Monoecia (monoecious but with some herma-
phrodite flowers).

Begonia was not placed in his correct class *Monoechia Polyandria* until *Supplementum Plantarum* 419 (1781), which contains some of Linnaeus's last writings edited, published, and amended by his son.

Previous authors have shown that once Linnaeus drafted a generic description he often left it unchanged from edition to edition of *Genera Plantarum*. A study of all the editions showed this to be true for *Begonia*. The only changes from the original listing in ed. 1: 360 (1737) was the addition of the dagger symbol starting with ed. 2: 516 (1742), the elimination after edition 4 of the literature reference "*vide H.H. IX 86,*" and beginning in ed. 5: 475 (1754) the addition at the end of his observation the note, "*Hermaphrodito petala quatuor adscribit Rumphius.*"

In the preface to *Species Plantarum* Linnaeus implied he had studied various herbaria. But the records indicate that he did not have time for more than a superficial look at them. Listed among those he saw was the herbarium of Bernard de Jussieu, which had specimens collected by Joseph Surian, who accompanied Plumier to the West Indies.

At the United States National Herbarium, searching for herbarium material that might have been seen by Linnaeus, I studied photographs of various herbarium specimens at the Paris Museum.

In the *Begonia macrophylla* Lamarck files were the most interesting photographs, No. 305 (Fig. 5) and its companion No. 879 (Fig. 6). Unfortunately the handwriting on the specimen is very faint, but what I could read is as follows, with the dots representing unreadable words:

Handwriting to left of stem,
"*Begonia maxima folio aurito purpurea* Plumier S T.3."

Handwriting to right of stem,
"*Oxalis Sylvarum major, americana folio sylvestris... nato carnosio, floribus umbellatis, colore varias nivea aut... ..purpureo...aut coccino aut rubro pallientis(?)... Calayou oxicardia* Surian 196 Swelle Karke... *Begonia nivea maxima folio aurito* Pl. Sp. 21... t3 5)...*folio...in Valle Mart.(?)...*

The number to right of stem is 196, (the Surian collection number) and at the bottom is "*vide n. 879.*"



Paris Museum Photograph No. 305
(Courtesy United States National Herbarium)

Figure 5



Paris Museum Photograph No. 879
(Courtesy United States National Herbarium)

Figure 6

The specimen No. 879 is of the inflorescence and also has the Surian number 196.

In the lower right hand corner, it is labeled:

Begonia purpurea et nivea maxima folio aurito Plum.
Oxalis maxima Petasitides folio
apud
Begonia nivea flore, folio aurito minor et glabra
Plumier

It is possible that Linnaeus saw these or other specimens in the Jussieu Herbarium and then added the dagger symbol in edition 2 (1742). But since he made no other changes in the generic character of *Begonia*, it is not logical that he could have studied the herbarium specimens and still not correct his erroneous understanding of *Begonia* flowers.

I consider this convincing evidence that Linnaeus did not determine his generic character for *Begonia* from herbarium material, but only from the literature he cited in edition 1 (1737): Tournefort, *Institutiones Rei Herbariae* app. 660. pl. 442 (1700) and Rheede, *Hortus Malabaricus* 9: 167. pl. 86 (1689). The Rheede citation was eliminated in edition 5 (1754), possibly because it did not conform to his description of the genus *Begonia*, its "hermaphrodite" flowers has only three petals.

Begonia .

Tab. 442.



Tournefort, *Institutiones Rei Herbariae*
app. 660: pl. 442. 1700.
(Courtesy Hunt Institute for Botanical Documentation)

Figure 7

660 INSTITUTIONES REI HERBARIÆ.

Begonia.

Tab. 444.

BEGONIA est plantæ genus, auctore Clariss. Plumerio, flore gemino, alio scilicet sterili A, ex quatuor petalis amplioribus B & angustioribus C composito : alio verò rosaceo D ex plurimis petalis E in orbem positis constante & calyci foliato F insidentibus : is autem deinde abit in fructum G trigonum, alatum H, in tria loculamenta I divisum, feminibusque fœtum exiguis L.

Begoniæ species sunt.

Begonia purpurea, maxima, folio aurito Plum.

Begonia roseo flore, folio aurito, minor & glabra Plum.

Begonia roseo flore, folio aurito, minor & hirsuta Plum.

Begonia roseo flore, foliis acutioribus, auritis & latius crenatis Plum.

Begonia roseo flore, folio orbiculari Plum.

Begonia nivea, maxima, folio aurito Plum.

Begoniam appellavit Clariss. Plumerius tanquam perenne observantiæ suæ monumentum erga Illustriss. virum D D. *Bégon*, Regi ab intus consiliis & Rei nauticæ Præfectum in orâ Santonum.

Translation

Begonia

Begonia is a genus of plants from the most renowned author Plumier. With two flowers, one evidently sterile, Fig. A; composed of four petals, the larger as in Fig. B, the narrower as in Fig. C; the other, however, with the petals arranged like a rose, Fig. D; with most petals as in Fig. E; placed in a ring and situated on the calyx provided with leaves [bracts], Fig. F; but it is then gone in the three-cornered fruit, Fig. G; wings, Fig. H; divided into three cells, Fig. I; and the little fertile seed, Fig. L.

The species of *Begonia* are:

The largest, red [flowered], *Begonia*, with eared leaf Plumier.

Begonia with rose flower, eared leaf, smaller and glabrous Plumier.

Begonia with rose flower, eared leaf, smaller and hirsute Plumier.

Begonia with rose flower, leaves more acute, eared, and broadly crenate Plumier.

Begonia with rose flower, round leaf Plumier.

The largest, white [flowered] *Begonia*, with eared leaf Plumier.

The most renowned Plumier named *Begonia* as a memorial of his lasting respect toward the most celebrated gentleman Begon, royal official and superintendent of marine affairs on the coast of Saintoge (S.W. France).

Linnaeus used the work of Tournefort as a foundation for his generic descriptions. Tournefort based his classifications mainly on the form of the corolla, he neglected the stamens because he did not understand their sexual functions. Linnaeus, however, being very aware of the true nature of stamens and pistils, built his "sexual system" of classification on them.

From the study of Tournefort's plate 442 and the description, it is not possible to determine the details concerning the stamens and pistils of the flowers illustrated because they were drawn the same in both flowers, A and D. The other citation--Rheede, *Hortus Malabaricus* 9: 167. pl. 86 (1689)--is for the plant called *Tsjeria-narinampuli*. From the illustration it is difficult to determine any detail of the stamens and pistils. But in the text Rheede refers to both male and hermaphrodite flowers.

Linnaeus had also seen Sloane's *History of Jamaica* and recognized *Aceris fructu herba anomala, flore tetrapetalo albo* from *Natural History of Jamaica* 1: 199, pl. 127 f. 1 & 2 (1707), as a *Begonia*. It has a good description of the staminate flower, but no details concerning the other flower, just a description of the capsule. The illustration is of one leaf and the capsule.

Linnaeus, probably influenced by Rheede, placed *Begonia* in his class *Polygamia*. But his observation after the *Begonia* description in *Genera Plantarum* indicates he was not completely satisfied with the decision. He most likely planned to check this again, but probably never had the time

PLUMIER'S MANUSCRIPT

Tournefort's knowledge of the genus *Begonia* came from the unpublished drawings and manuscript of Plumier, "Botanicon Americanum Seu Historia Plantarum in Americanis Insulis Nascentium" 1689-1697. These original drawings and manuscripts are now in the Museum d'Histoire Naturelle in Paris (Stafleu, *Tax. Lit.* 360. 1967). Photographs of the *Begonia* drawings in Volume 3 were published in Haegeman, *Tuberous Begonias* 10-15. pl. 2-6. 1979.

I am grateful to J. Haegeman for sending me copies of these photos which he obtained from the Paris Museum. The figures numbers 2, 7 and 8 in his book *Tuberous Begonia* are reproduced here as figures 2, 3 and 4.

Figure 2 is *Begonia nivea et rosea maxima, folio aurito* Plumier, mss. "Botanicon Americanum" 3: pl. 6. 1689-97; Haegeman, *Tuberous Begonias* 15. fig. 7. 1979. The original is a color plate depicting the details of the leaf, roots and flowers. Originally, this drawing was labeled by Plumier "+ oxalis maxima semipetasitidis folia" [Largest Oxalis with leaf almost like the Petasites]. The + before the name indicates that the identity was uncertain. Below this, he wrote *Begonia nivea et rosea maxima folio aurito*. This drawing has the number 156 in the upper left corner.

Figure 3 is *Begonia purpurea maxima, folio aurito* Plumier, mss. "Botanicon Americanum" 3: pl. 5 fig. 1. 1689-97; Haegeman, *Tuberous Begonias* 10. fig. 2. 1979. This black and white plate shows the habit and general arrangement of the flowers and capsules. The numbers 257-266 are in the lower left corner. Some additional information under the phrase name has been blocked off.

Figure 4 is *Begonia purpurea maxima, folio aurito* Plumier, mss. "Botanicon Americanum" 3: pl. 5 fig. 2. 1689-97; Haegeman, *Tuberous Begonias* 15. fig. 8. 1979. The original plate is a colored rendition of the central portion of Fig. 3 showing the habit. There is a number 192 in the upper right hand corner. There was some writing in the lower right hand corner of the drawing that was blocked off.

PLUMIER'S MANUSCRIPT

A copy of Plumier's manuscript description of *Begonia purpurea et nivea, maxima, folio aurito*, with my transcription and translation follows:

Excerpt from Plumier manuscript "Botanicon Americanum
Seu Historia Plantarum in Americanis Insulis Nascentium"
prepared between 1689 and 1697.

Begonia purpurea et niva, maxima, folio munda.

Petalidium nesiutum faciem quam primum emulatur
Humida planta elegantissima aspectuque secundissima facies. cum
sane aspectus mihi plusquam ceterarum plantarum quas apud
insulas Americanas observavimus, semper arrisit, tum propter
foliorum nitorem splendorem et situm, tum propter inferum flo-
rum amarum ruborem aut candorem nivem, et dispositionem.

planta est igitur aut rivulos aut sylvas montosas et
humidas amans, cum radices multum fibrosas, ramosas, multumque
graminum instar repentes et diffusas, unde caudiculi quidam prodeunt
semidigiti fere crassi et folia multa petalidum nesiutum
formam fere et amplitudinem obtinentia nisi unum ipsius Cassi
Latus in amplam auriculam extenderetur. singula haec folia
carnosa sunt et aculearum nesiutum instar aunda subius albicantia
costisque multis eminentibus nervosa, desuper vero glabra, saltem sed
splendente virore polita, fusque exiguis ex oppositis Cassi
insculpta

Caudiculi ipsi robusti sunt unti, erundi subicundi fragiles
et gemulati, non multum albi, ad singulos gemulos unico folio
infructu ram dicto, et in pedamentum desinentes paulo magis semi-
pedem altum, tuberosum, et multoties in ramulos bifurcos
divisum ita ut flores ipsi qui singulis ultimis ramulis insident
umbellam conspiciunt videantur elegantissimam. flores autem aut
steriles sunt aut fertiles. hi ab sterilibus separantur in eadem
planta in pedamento peculiari, rosaceique sunt quinque scilicet
petalis ovatis semipollicem amplis, aut roseis aut niveis, in orbem
prospici, stamina quaedam cum apicibus suis aureis, circumdantibus et
calyci insidentibus virgatis et angulosis. qui calyx ab eis deinde in
fructum membranaceum ^{subulato} triangularum et ovalium, una ex alijs
magis alijs extensa, intra locamenta divisum, seminis tota
exigujs per fissuram quandam dilabentibus

Flores vero steriles, fere cruciformes insunt licet
rosacei, quatuor etenim conflant petalis in orbem equidem prospici
sed inaequalibus, duobus scilicet maioribus oppositis, duobus alijs
minoribus etiam oppositis et ad angulos rectos cum maioribus, cons-
titutis. maiora ovata sunt elongulam proliis fere ampla,
minora angusta et acuminata circaque staminula quaedam aurea
apposita.

plantam nullibi reperi ^{mihi} apud insulam Martinic-
ensem, sed in fluviolum Arcem ^{apud} Livi perit prolatam et
est illam montem qui vulgo Le morne de la Calabasse
nuncupatur

Transcription

Begonia purpurea et nivea, maxima, folio aurito

Petasitidum nostratum faciem quam primun aemulatur Hujusce plantae elegantissimae aspectuque jucundissimae facies. Cuius sane aspectus mihi plusquam caeterarum plantarum quas apud insulas Americanas observai enim, semper ami sit, tum propter foliorum nitorem splendens et situm, tum propter ipsorum florum amoenum rubrum roseum aut candorem niveum dispositionem.

Planta est igitur aut rivulos aut sylvas montosas et humidas amans, cuius radices multum fibrosa, ramosae multumque graminum instar repentes et diffusae, unde cauliculi quidam prodeunt semidigitum fere crassi et folia multa petasitidum nostratum forman fere et amplitudinem oblinentia nisi unum ipsius basis latus in amplam auriculam extenderetur. Singula haec folia carnosae sunt et acetosarum nostratum instar acida, subtus albicantia costisque multis eminentibus nervoso desuper vero glabra, saturo sed splendens virere polita, subtileque exquis ex opposito costarum insculpta.

Caulicului ipse rotundi sunt uniti, eviridi rubicundi fragiles et geniculati, non multum alti, ad singulos nucleos unico folio instructi jam dicto, et in pedamentum desinentes paulo magis semi-pedem altum, rubens centrum et multoties in ramusculos bisurculos divisum ita ut flores ipsi qui singulis ultimus ramusculis insident umbellam conspicuere videantur elegantissimam. flores autem aut steriles sunt aut fertiles. sui ab sterilibus separantur in eadem plantae in pedamento peculiari, rosaceique sunt, quinque scilicet petalis ovatis semipollicem amplis, aut roseis aut niveis, in orbem positae, stamina quaedam cum apicibus suis aureis circumdantibus et calyci insidentibus virenti, et anguloso. qui calyx abit deinde in fructum membranaceum fulvum triangulatum et trialatum. (una ex alis magis aliis extensa) intra loculamenta divisum, seminibus foeta exquis per fissuram quandam dilabentibus.

Flores vero steriles, fere cruciformes insunt licet rosacei, quatuor etenim constant petalis in orbem equidem positae sed inaequalibus, duobus scilicet majoribus et oppositis, duobus aliis minoribus etiam oppositis et ad angulos rectos cum majoribus,

constitutis, majora ovata sunt et unguis pollicis fere ampla, minora angusta et acuminata circaque staminula quaedam aurea ad posita.

Plantam nullibi reperi mihi apud insulam martinicanum, secus fluviolum arcem divi petri praeterlabentem et versus illum montem qui vulgo Le morne dela Calebasse nuncupatur.

Translation

The largest, red, and white [flowered] *Begonia*, with eared leaf.

Although at first emulating the appearance of native *Petasites* this plant has a most elegant appearance and delightful form. The very appearance of it is more [attractive] than the rest of the plants which were observed in the writings of the American Islands, always lovely, not only because of the brilliance and arrangement of the glossy leaves but also because of the regular arrangement of the beautiful flowers themselves, red, rose, or pure snow white.

The plant is then either of streams or mountain woods and loving moisture, the roots of which are very fibrous and very branched, creeping and spread out like grass, whence grow small stems almost a half finger thick and laden with many leaves almost the form and size of the native *Petasites*, except one of the sides of the base extended like a large ear. The leaves are fleshy, of an acid flavor like the native sorrel, whitish below with many veins from the projecting midrib, but above glabrous, deeply yet shining polished green and with weak sunken markings below opposite the midrib.

Its small stems are round, united, reddish green, brittle and geniculate, not very tall, provided with one leaf to each node, leaves already described, and ending in peduncles a little more than 1/2 foot high, reddish at the center and many times divided into small branches with two shoots, in such a way that the flowers themselves, which are arranged one on each of the final branchlets in an umbel, appear most elegant to behold. The flowers are either sterile [male] or fertile [female], itself separated from the sterile in the same plant, on its own peduncle; like the flower of a rose, there are five ovate petals, large as half an inch, either rose or snow white, placed in a circle, some

cylindrical stamens with golden yellow tips, and situated on a green calyx with prominent angles, which calyx vanishes thereupon into membranous tawny fruit three-angled and three-winged (one more extended than the others) divided in three projecting chambers, the seeds fertile, little, fissured all over then falling asunder.

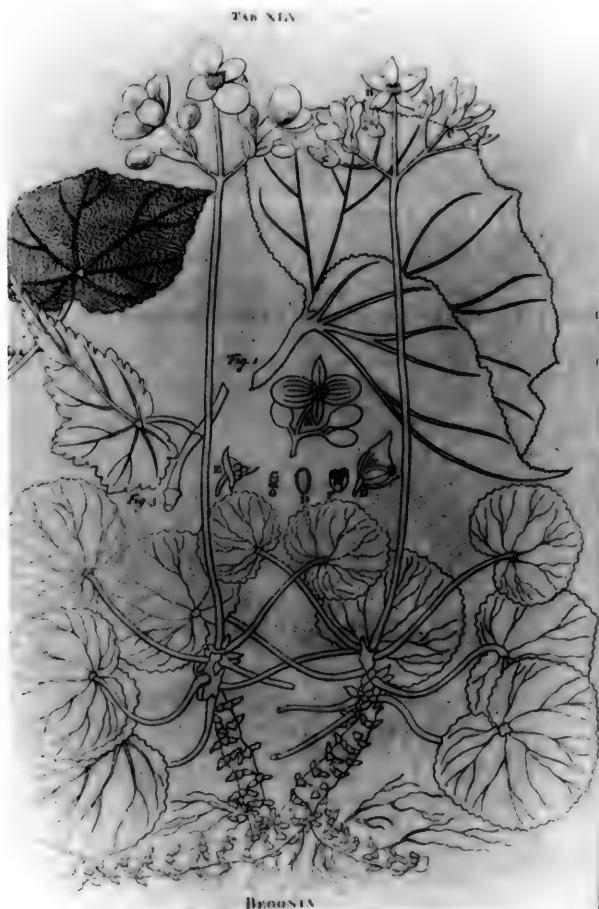
The truly sterile flowers are for the most part cross-shaped although some like the flower of a rose, since four uniform petals are placed equally in a circle, yet most are unequal with two evidently larger and opposite with two of the others certainly smaller opposite and arranged at an upright angle with the larger ones. The larger are ovate and about as large as a thumb ring, smaller ones narrower and acuminate, placed around some golden yellow stamens.

This fine plant was found by me on the nearby Island of Martinique along the rich curves of the little river flowing past rocks and towards that mountain commonly called Le morne dela Calebasse.

Plumier identified his drawing Fig. 2 by the phrase name *Begonia nivea et rosea maxima folio aurito*; the drawing Fig. 3 by the phrase name *Begonia purpurea maxima, folio aurito*; and his manuscript with the title *Begonia purpurea et nivea, maxima, folio aurito*. In his *Catalogus Plantarum Americanarum* on page 20, he listed *Begonia purpurea, maxima, folio aurito* and on page 21, *Begonia nivea, maxima, folio aurito*.

Plumier described the flowers as reddish, rose and white. There is confusion concerning the exact color intended by the adjective *purpurea* as indicated by this definition in Lewis & Short, *Latin Dictionary*, "purple-colored, purple, including very different shades of color as red, reddish, violet, brownish, black...." We know *Begonia* does not have purple flowers, so from the manuscript, I deduce that Plumier used *purpurea* as a synonym for *ruber*, red.

It is clear that Plumier considered his three drawings, Figures 2, 3 and 4 to be the same species, which is best designated as *Begonia purpurea, nivea, et rosea, maxima, folio aurito*.



Plumier, *Plantarum americanarum* 2: Plate 45. 1756.

- MAIN FIG. *Begonia roseo flore, folio orbiculari*
Plumier. = *Begonia rotundifolia* Lamarck.
FIG. 1. *Begonia purpurea et nivea maxima, folio aurito*
Plumier. = *Begonia obliqua* Linnaeus.
FIG. 2. *Begonia roseo flore, folio aurito, minor et*
hirsuta Plumier. = *Begonia repens* Lamarck.
FIG. 3. *Begonia roseo flore, foliis acutioribus*
auritis, et late crenatis Plumier. = *Begonia*
plumieri A. DC.

(Courtesy Hunt Institute for Botanical Documentation)

Figure 8

A study of the Tournefort Plate 442 (Fig. 7) shows that the details are an almost exact copy of the details of the Plumier drawing Plate 6 (Fig. 2).

Copies of the Plumier drawing were made by Claude Aubriet in 1733 for Herman Boerhaave and are known as "Codex Boerhaavianus." Included in this series was Plate 123, *Begonia purpurea maxima folio aurito* and Plate 124, *Begonia nivea maxima folio aurito*. I. Urban, "Plumiers Leben und Schriften" *Repert. Sp. Nov.* 5:45 (1920), noted that these plants differed only by the color of the flowers. I had wanted to include copies of these two plates here, but unfortunately, I was unable to procure them from the Library at Groningen. I assume Plate 123 is a copy of the original drawing in Plumier's manuscript "Botanicon Americanum" 3: *pl.* 5 (fig. 4) and that Plate 124 is a copy of the mss. *pl.* 6 (fig. 2).

The Boerhaave copies were used by Johannes Burman for the preparation of Plumier, *Plantarum Americanarum* 2: 33-34, *pl.* 45. 1756 (fig. 8). The flower details, A through D, in the central part of Plate 45 are exact copies of the details of the Plumier original drawing Plate 6 and the Tournefort Plate 442. The large leaf Fig. 1 of Plate 45 is a copy of the right leaf of the drawing, my Figures 3 and 4.

Linnaeus saw the Boerhaave drawings in 1737-38. At that time, he made notes and wrote specific diagnosis opposite the relevant genera in the "interleaved and annotated copy of the *Genera Plantarum* ed. 1, now in the Library of the Linnean Society of London" (Polhill & Stearn, *Taxon* 25: 325. 1976).

I wrote to the Library requesting they check to see if Linnaeus made any notations on page 360 concerning *Begonia*, but I received no reply. However, since Linnaeus considered *Begonia*, as only one species, I expect he did not make any notations there about *Begonia*.

DETERMINATIONS OF THE TYPE

From all this evidence, I conclude that Linnaeus based the generic description for *Begonia*, in *Genera Plantarum* ed. 5. 475. 1754, on the Tournefort Plate 442 (fig. 7) and the diagnostic note for his

trivial epithet *obliqua*, in *Species Plantarum* 2: 1056. 1753, was based on the copy of Plumier's drawing Plate 124 in the "Codex Boerhaavianus"

Therefore, I designate as lectotype of *Begonia obliqua* Linnaeus the Plate 124 *Begonia nivea maxima, folio aurito* "Codex Boerhaavianus" in the Library of the Rijksuniversiteit, Groningen.

Both the Boerhaave Plate 124 and the Tournefort Plate 442 were copied from the original Plumier drawing (Fig. 2) *Begonia nivea et rosea maxima, folio aurito* Plumier, mss. "Botanicon Americanum" 3: pl. 6. 1689-97, which I designate typotype of *Begonia obliqua* Linnaeus. I would have preferred to select this original Plumier drawing as the type, but unfortunately, it was not seen by Linnaeus.

The character of *Begonia obliqua* Linnaeus is illustrated by Figure 1, a composite drawing made by my daughter, Marilyn White, of the essential elements selected from the original Plumier drawings, Plate 5 *Begonia purpurea maxima, folio aurito* and Plate 6 *Begonia nivea et rosea maxima, folio aurito*.

THE CORRECT NAME AND SYNONYMY

Begonia obliqua Linnaeus, *Species Plantarum* 2: 1056. 1753. Lectotype: *Begonia nivea maxima, folio aurito* Plumier, "Codex Boerhaavianus" plate 124. 1733. Typotype: *Begonia nivea et rosea maxima, folio aurito* Plumier, mss. "Botanicon Americanum" 3: pl. 6. 1689-97.

Begonia purpurea, maxima, folio aurito Plumier, mss. "Botanicon Americanum" 3: pl. 5 f. 1 & 2. 1689-97; Plumier in Tournefort, *Inst. Rei Herb.* app. 660. pl. 442. 1700; Plumier, *Cat. Pl. Amer.* 20. 1703.

Begonia nivea maxima, folio aurito Plumier in Tournefort, *Inst. Rei Herb.* app. 660. pl. 442. 1700; Plumier, *Cat. Pl. Amer.* 21. 1703.

Begonia purpurea et nivea maxima, folio aurito Plumier in Burman *Pl. Amer.* 2: pl. 45 f. 1. 1756.

Begonia obliqua Jacquin, Observ. Bot. 2: 11. 1767.

Begonia macrophylla Lamarck, Encycl. 1: 394. 1785;
O. E. Schulz, Urban Symb. Antill. 7: 21. 1911.

Begonia grandifolia Jacquin, Collectanea 1: 128.
1787. excl. syn. Brown.

Begonia martinicensis A. DC. Ann. Sc. Nat. IV. 11:
123. 1859; O. E. Schulz, Urban Symb. Antill. 7:
21. 1911.

Begonia rotundifolia Grisebach, Fl. Brit. W. I.
304. 1860; O. E. Schulz, Urban Symb. Antill.
7:22. 1911. non Lamarck.

CONFUSION IN THE LITERATURE

Much of the confusion in the literature concerning the name *Begonia obliqua* is because Linnaeus considered all the *Begonia* known to him as one species and then listed them as its synonyms. Later authors have studied these plants and determined them to be separate species.

Lamarck, *Encyclopedie Methodique, Botanique* 1: 394. (1785) included the type of *Begonia obliqua* Linnaeus in his protologue of *Begonia macrophylla*, therefore, Lamarck's name is superfluous.

The species named for the other synonyms are as follows:

Aceris fructu herba anomala, flore tetrapetalo albo
Sloane, Cat. Pl. Jam. 83. 1691; Nat. Hist. Jam.
1: 199. pl. 127. 1707.

= *Begonia acutifolia* Jacquin, Collectanea 1: 128.
1787.

*Rumex sylvestris scandens, foliis cordato-angulatis ab
altera parte majoribus* Browne, Jam. 203. 1756,
excl. syn.; O. E. Schulz, Urban Symb. Antill.
7:6. 1911.

= *Begonia glabra* Aublet, Hist. Pl. Guiane 2:913.
pl. 348. 1775, pro parte.

Observation:

From the synonyms listed by Browne, this could be equal to either *Begonia acutifolia* Jacquin, or *Begonia malabarica* Lamarck, but it is not cited as the synonym of either of these by either author.

Empetrum acetosum Rumphius, Herb. Amb. 5: 457. pl. 169 f. 2. 1747.

= *Begonia tuberosa* Lamarck, Encycl. 1: 393. 1785.

Begonia roseo flore, folio aurito, minor et glabra
Plumier in Tournefort. Inst. Rei Herb. app. 660.
1700; Plumier, Cat. Pl. Amer. 20. 1703; Linnaeus,
Sp. Pl. 2: 1056. 1753, as *Begonia obliqua* var. *beta*.
= *Begonia brachypoda* O. E. Schulz, Urban Symb. Antill.
7: 15. 1911.

Observation:

Lamarck, Encycl. 1: 394 (1785) had considered this to be a variety of his *Begonia repens* Lamarck, but O. E. Schulz disagreed. Lamarck also cited Plumier in Burman, Pl. Amer. Plantarum 2: pl. 45 fig. 3. 1756, but this was an error as his description did not apply to this figure; Fig. 3 has been determined to be a different species, *Begonia plumieri* A. DC.

Begonia roseo flore, folio aurito, minor & hirsuta
Plumier in Tournefort, Inst. Rei Herb. app. 660.
1700; Plumier, Cat. Pl. Amer. 20. 1703; Linnaeus,
Sp. Pl. 2: 1056. 1753, as *Begonia obliqua* var.
gamma; Plumier in Burman, Pl. Amer. 2. pl. 45 f. 2.
1756; Golding, Phytologia 39: 115. 1978.
= *Begonia repens* Lamarck, Encycl. 1: 394. 1785.

Begonia roseo flore, folio orbiculari Plumier in
Tournefort, Inst. Rei Herb. app. 660. 1700;
Plumier, Cat. Pl. Amer. 20. 1703; Linnaeus,
Sp. Pl. 2: 1056. 1753, as *Begonia obliqua* var.
delta; Plumier in Burman, Pl. Amer. 2: pl. 45
main fig. 1756.
= *Begonia rotundifolia* Lamarck, Encycl. 1: 394. 1785.

*Begonia roseo flore, foliis acutioribus auritis et late
crenatis* Plumier in Tournefort, Inst. Rei Herb.
app. 660. 1700; Sp. Pl. 2: 1056. 1753, as *Begonia
obliqua* var. *epsilon*; Plumier in Burman, Pl. Amer.
2. pl. 45 f. 3. 1756.
= *Begonia plumieri* A. DC. Prodrum 15(1): 295. 1864.

*Begonia hirsuta, flore albo, folio aurito, fructu
crenato* Barrere, Hist. Fr. Equin. 21. 1741, as
..., *fructu coronato*; Linnaeus, Sp. Pl. 2:
1056. 1753, as *Begonia obliqua* var. *zeta*.
= *Begonia hirsuta* Aublet, Hist. Pl. Guiane 2: 913.
pl. 348. 1775.

THE LAST LINNAEUS CITATION OF *BEGONIA OBLIQUA**Mantissa Plantarum Altera* 502. 1771

502

POLYGAMIA.

Begonia obliqua, Species forte plures. Capensis species sequendi structura est.*Radix* tuberosa, crassa.*Scape* teretiusculi, petiolis longiores, paniculat.*Folia* radicalia, petiolata, oblique cordata, repanda, denticulata.♂ *Petala* 2, obcordata, erecta; 2 cordata, pallide rosea.*Stamina* multa, *Anthodis* linearibus, filamentis longioribus.♀ *Corolla* maris. *Stamina* nulla.*Styli* 3, ramosi, filiformes, *Stigmata* obtusa.*Capsula* infera, trilatera lateribus inaequalibus.*Koenig.*Obs. *Tilia* narinum pulli. *Rheed. mal.* 9. p. 167. t. 86. est caulescens, Floribus masculisAndris; Hermaphroditis 3petalis secundum *Rheede*.

Translation

Begonia obliqua

Species perhaps more. The species from the Cape is with the following structure.

Root - swollen into a tuber, thick

Scape - somewhat cylindrical, longer than the petiole, with flowers borne in a panicle.

Leaves - arising from the root, petiolate, obliquely cordate with slightly uneven and wavy margins, denticulate.

Male flowers

Petals - two reverse cordate, erect; two cordate, pale rose.

Stamens - many, *anthers* linear, longer than the filaments.

Female flowers

Corolla - like the male. *Stamens* - none.

Styles - 3, branched, threadlike. *Stigma* obtuse.

Capsule - inferior, three-sided, unequal, according to Koenig.

Observation:

Tsjernia-narinampuli Rheede, Hortus malabaricus 9: 167. (1689) pl. 86. It is stemmed, the male flowers male only: hermaphrodite with 3 petals, according to Rheede.

This final use of the name *Begonia obliqua* by Linnaeus is interesting for several reasons. It indicates his uncertainty about proper classification for *Begonia*. He still kept it in his class Polygamia, but showed it to have separate male and female flowers noting it did not have stamens as if he still thought it might or should have some.

He probably added his observation concerning *Tsjernia-narinampuli* to justify retaining *Begonia* in his class Polygamia.

SUPPLEMENTUM PLANTARUM

Supplementum Plantarum (1781) contained writings of Linnaeus that were edited and published by his son. On pages 419 and 420 there are several citations for *Begonia* as separate species that were given epithets. Included was the following citation:

420 MONOECIA. Polyandria.

Capensis. BEGONIA acaulis, foliis inæqualiter denticulatis.
Begonia obliqua. *Mant. plant.* p. 502.

Begonia capensis, stemless with leaves unequally denticulate.

Here, the son of Linnaeus renamed the *Begonia obliqua* Linnaeus in *Mantissa Plantarum Altera* 502, (1771) as *Begonia capensis* Linnaeus f. in *Supplementum Plantarum* 420 (1781).

Dryander (Trans. Linn. Soc. 1: 170. 1791) gave this species a new name, *Begonia diptera*. But under Article 62.1 ICBN (1978) a legitimate name must not be changed arbitrarily; therefore, *Begonia capensis* L. f. having priority is the correct name.

CITATIONS BY OTHER AUTHORS

Jacquin used the name *Begonia obliqua* for the plant he found growing in Martinique. The following description in his *Observationum Botanicarum* 2: 11. 1767.

BEGONIA OBLIQUA.

BEGONIA. *Linn. sp. pl. 1. p. 1497.* Ubi vide synonymiam.

Occasione *Acetosæ* præcedentis etiam hujus *Acetosæ* sylvestris (ita enim Gallicum nomen *Ozeille des bois* sonat) mentionem facere volui. Est autem planta elegantissima, quæ in Martinicæ montibus umbrosis & udis passim crescit. Inveni quoque in ipsis humentibus faxis & rupibus ad torrentes loco aprico. Est bipedalis, succulenta, annua forte vel biennis, patula, adspectu decora. Habitu admodum variat, ita ut *Plumerianæ* diversæ species loco magis minusve udo vel aprico ortum debeant. Folia succulenta & acida a quibusdam *acetosæ hortensis* in modum in cibis adhibentur.

Translation

Begonia obliqua

Begonia Linnaeus, *Species Plantarum* 1: 1497. [ed. 2. 1763]. In which place see the synonymy.

At the same time as the above *Acetosa* I wish to mention also this *Acetosa* of the woods (thus indeed it is called the French name "ozeille des bois" [wood sorrel]). It is however a most elegant plant, which grows here and there in shady and damp mountains of Martinique. I have found each in groups by themselves on damp cliffs and rocks in sunny places near cataracts. It is 2 feet tall, succulent, an annual or perhaps biennial, spreading and beautiful to look at. It varies

much in appearance; thus, for example, the different species of Plumier might be a result of their growth in more or less damp or sunny places. The succulent, acid leaves of some *acetosas* of the gardens are used as food.

Observation:

Jacquin noted that the appearance of the *Begonia* he found growing in the mountains of Martinique were very varied because of their growth in different environments. He speculated that the species of Plumier may also differ only because of their origin from various places.

At that time (1767) Jacquin did not consider the plants he found and those of Plumier as separate species, so he followed Linnaeus and used his name *Begonia obliqua*.

It was 20 years later when Jacquin, (Collectanea 1: 127-8, 1787) wrote, "The *Begonia* once called *obliqua* by Linnaeus included several species." There he listed *Begonia obliqua* (Observ. Bot. 2: 11, 1767) as a synonym of *Begonia grandifolia* Jacquin 1787.

The correct citation for Jacquin's *obliqua* is:

Begonia obliqua Jacquin, Observ. Bot. 2: 11. 1767.

[= *Begonia grandifolia* Jacquin, Collectanea 1:

128. 1787; = *Begonia macrophylla* Lamarck,

Encycl. 1: 394. 1785; Dryander, Trans. Linn. Soc.

1: 164. 1791.]

= *Begonia obliqua* Linnaeus, Sp. Pl. 2: 1056. 1753.

The name *Begonia obliqua* was also used by other authors for various species of *Begonia*. These citations are listed with their correct name.

Begonia obliqua Thunberg, Fl. Jap. 231. 1784, non Linnaeus 1753; Kaempfer, Amoen. Exot. Fasc. 5: 888. 1712; as *Sjukaido* Kaempfer, Icon. Select. Pl. pl. 20. 1791.
= *Begonia grandis* Dryander, Trans. Linn. Soc. 1: 164. 1791.

Begonia obliqua l'Heritier, Stirp. Nov. 2: 46. 1788. non Linnaeus 1753.
[= *Begonia nitida* (Dryander in) Aiton, Hort. Kew 3: 352. 1789.]
= *Begonia minor* Jacquin, Collectanea 1: 126. 1787; Jacquin, Collectanea 3: 18. pl. 618. 1791.

Begonia obliqua Schneevoegt, Icon. Pl. Rar. pl. 24. 1793. non Linnaeus [= *Begonia obliqua* l'Heritier] O. E. Schulz in Urban, Sym. Antill. 7: 10. 1911.
= *Begonia minor* Jacquin, Collectanea 1: 126. 1787.

Begonia obliqua Vellozo, Fl. Flum. Icon. 10: pl. 48. 1831; Fl. Flum. Descr. ed. 2. in Arch. Mus. Nac. Rio de Janeiro 5: 406. 1881. non Linnaeus 1753.
[= *Begonia patula* Haworth; Smith & Schubert Journ. Wash. Acad. Sci. 40 (8): 245. 1950.]
= *Begonia fischeri* Schrank, Pl. Rar. Hort. Acad. Monac. 2. pl. 59. 1820.

Begonia obliqua herb. Ruizii ex Klotzsch, Begonia-
ceen 101. 1855. pro syn. non Linnaeus 1753;
A. DC. Prodrum 15(1): 333. 1864.
= *Begonia cyathophora* Poeppig & Endlicher, Gen. et
Sp. 1: 7, pl. 14. 1835.

Note:

Begonia obliqua Linnaeus, Sp. Pl. 1056 (1753) has been frequently listed as a synonym of *Begonia acuminata* Dryander and *Begonia acutifolia* Jacquin.

Acknowledgments:

Gratefully, I acknowledge the assistance of all who helped with the preparation of this monograph:

Dr. Lyman B. Smith and Dr. Dan Nicolson for their guidance, encouragement and critiques of my early draft manuscript.

Carrie Karegeannes for her assistance with the translation, our many discussions and her critique of my manuscript.

Dr. Gilbert Daniels and Dr. Bernice Schubert for their discussions with me on this subject and help obtaining copies of literature from the libraries at the Hunt Institute and Arnold Arboretum.

Mrs. Schallert of the Smithsonian Institution Library, Mrs. Lothian Lynas and Gerard McKiernan of the New York Botanical Garden Library for their research assistance and copies of literature.

Dr. J. Haegeman for publishing the Plumier manuscript drawings of *Begonia* and sending me copies.

Dr. Alicia Lourteig for the information concerning the original drawing in Plumier mss. "Botanicon Americanum".

Marilyn White for the composite drawing of *Begonia obliqua*.

This listing does not imply concurrence with all the interpretations and conclusions, which are the responsibility and opinion of the author.

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PHYTOPLANKTON OF THE TITTABAWASSEE RIVER, MIDLAND, MICHIGAN

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ABSTRACT

Phytoplankton samples were collected from June 1977 to January 1979. Low and high occurrences were in the winter (January, 1979) and spring-summer (May, 1978) respectively. Twenty-three taxa were dominant (> 5% occurrence at any station) among the 301 taxa observed. The dominant species were representatives of the divisions Chlorophyta, Bacillariophyta, Cyanophyta, and Cryptophyta.

INTRODUCTION

The Tittabawassee River is one tributary of the Saginaw River, a system which drains the majority of the east central region of Michigan. The Tittabawassee drains approximately 678,577 hectares of flat to slightly rolling terrain in central Michigan (6). The city of Midland is the only major population or industrial center located on the river.

The Michigan Department of Natural Resources conducted biological surveys of the Tittabawassee River in 1971 and 1972 (1) and 1974 (7), to determine water quality conditions. Phytoplankton identifications in those studies were to the generic level only. Sixty genera were distinguished in 1971-72, and 45 genera in 1974.

SITE DESCRIPTION

Five transects were established in the vicinity of Midland, Midland County, Michigan in a major industrial section of the Tittabawassee River (Fig. 1). Three stations were established at each transect. Facing upstream, station 1 was one-third the distance from the left bank, station 2 in the middle of the river, and station 3 one-third across from the right bank.

Transect A (67 m across) was located 175 m above Dow Chemical Company's Tertiary Treatment Pond effluent. Transect B was directly upstream of the Midland Nuclear Power Plant, Consumer's Power Company. Transect C was located directly below the tertiary treatment discharge, while transect D was 1 km below the tertiary outfall and immediately below the city of Midland's sewage treatment effluent. Transect E was 84 m across, and was located 12 km below the power plant site, and 0.5 km above the Freeland Road bridge near the town of Freeland, Michigan.

MATERIALS AND METHODS

Whole water grab samples were collected at two transects (A and E) in June, August and October 1977, and at four transects (B, C, D, E) in April, May, July, August, September and November 1978, and January 1979. Triplicate samples were taken at each station in a transect.

In the laboratory, Lugol's Iodine was added to a 0.5 or 1 liter aliquot of each sample, and the phytoplankton concentrated by sedimentation. A second aliquot (45 ml) of the original sample was preserved when phytoplankton density was sufficient for enumeration without concentration.

Phytoplankton were enumerated at a magnification of 450X (1977) or 400X (1978). A 0.1 ml aliquot of sample was placed in a Palmer-Maloney counting chamber, and every other row observed across the counting chamber. All soft bodied algal cells encountered were identified to the lowest possible taxon. Diatoms were grouped into growth forms.

Strewn burnt Hyrax mounts were made from the concentrated samples for diatom species identification and enumeration. Percent composition of each species of the growth forms were calculated from the Hyrax slide counts as 1000X.

Occurrence (cells/ml) and percent occurrence were calculated for individual taxa and major algal divisions.

PHYTOPLANKTON ABUNDANCE

Phytoplankton abundance was lowest in January 1979, and highest in May 1978 (Fig. 2). Most maximum abundances occurred during the summer months, while lows were generally noted in April 1978 and January 1979. In the Sandusky River during 1973 and 1974, the lowest abundances were also recorded in the winter and early spring (4).

During sampling in 1977, phytoplankton occurrence was usually greatest at transect E, the transect located farthest downstream and at that time the sampling site most directly effected by the city of Midland's discharge. In 1978 however, occurrence in 1978 was greatest at transect D, downstream of Dow Chemical Company's tertiary treatment discharge. The standing crops observed were much higher than those observed by the earlier Department of Natural Resources studies (1,7).

A total of 301 taxa in 96 genera, representing eight divisions were observed during the sampling period (Table 1). Ninety-five taxa were observed in both 1977 and 1978, while only 10 additional taxa were present in 1977only, and 196 taxa were observed only in 1978. This difference was due to the more intensive sampling design in 1978.

Only the divisions Bacillariophyta, Cyanophyta and Chlorophyta were important in terms of percent composition during 1977 and 1978 (Fig. 3). In January 1979 however, the division Cryptophyta became important due to the extreme abundance of one species.

A total of 23 phytoplankton species were dominant (>5% occurrence at any station, during the sampling period, including six blue-green species (Cyanophyta), ten green species (Chlorophyta), six diatom species (Bacillariophyta) and one member of the division Cryptophyta (Table 1). Only six species were dominant in 1977, with three of those among the 20 dominant in 1978-79.

Occurrence (cells/ml) of members of the division Chlorophyta were greater than all others at all sampling dates except the spring date (April and May 1978). Green algae were the second most important group in the Sandusky River near Fremont, Ohio (4). Sixty-three taxa in 33 genera were observed and ten species were dominant. In 1977, Crucigenia tetrapedia and Scenedesmus quadricauda were dominant and in 1978 the dominant species included Ankistrodesmus falcatus, Chlamydomonas snowii, Chlamydomonas sp., Chlorella vulgaris, Coelastrum sphaericum, Cloecystis vasculosa, Pandorina morum, Scenedesmus quadricauda, and an unidentified green coccoid. The majority of these species peaked in occurrence in August and September.

The division Bacillariophyta was the most diverse group, but in 1977 was a minor contributor to the percent composition. In 1978, diatoms were the most abundant group in April and May. In the Arkansas River, 1975-76, maximum occurrence of plankton diatoms occurred in early spring (12). A total of 33 genera and 194 diatom taxa were observed. Only Cyclotella meneghiniana was dominant in both years. The other dominant species (1978) included Cyclotella michiganiana, Cyclotella pseudostelligera, Cyclotella stelligera, Stephanodiscus invisitatus and Stephanodiscus subtilis. Many of these centric forms are typical of alkaline rivers in the midwestern United States where they are often the most abundant group of river phytoplankton (4). This tendency has been observed in the Sandusky (4), Little Miami (10) Susquehanna (9), and Mississippi Rivers (2). Stephanodiscus invisitatus peaked in occurrence in April 1978. This species was also a spring dominant in the Sandusky River, Ohio (4). Cyclotella meneghiniana, C. pseudostelligera and C. stelligera were fall dominants here in the Tittabawassee River and in the Sandusky River (4). Cyclotella was also the most abundant phytoplankton genus in the Arkansas River (12).

The division Cyanophyta was never the largest contributor to the percent composition, but it was an important group in the summer months. Twenty-two taxa (12 genera) were observed, and seven taxa were dominant. Dactylococcopsis fascicularis and Dactylococcopsis raphidioides were dominant in 1977 only, Merismopedia tenuissima was dominant in both years, and Anabaena sp., Chroococcus dispersus and Chroococcus limneticus in 1978.

The division Cryptophyta was important in percent composition only in January 1979 samples. One species, Chroococcus nordstedtii, was extremely abundant at this time, with peak occurrence of 81.2% at one station. Chroococcus nordstedtii was not observed at any other time during the sampling period.

Spectral preference data were compiled for the dominant species in the Tittabawassee River (3, 5, 8, 11). This tabula-

tion indicated a community which was acidophilous to indifferent in pH, mesosaprobic to oligosaprobic, indifferent to halobion spectrum, limnophilous, planktonic to tycho planktonic, and eutrophic.

SUMMARY

1. Phytoplankton abundance in the samples taken at five transects in the Tittabawassee River from June 1977 to January 1979, was greatest in the summer and lowest in the winter. Overall peak high and low occurrences were in May 1978 and January 1979, respectively. Abundances were greatest at transects downstream of tertiary sewage treatment outfalls.

2. 301 taxa in 96 genera of 8 divisions were identified. The divisions Chlorophyta, Bacillariophyta and Cyanophyta were major contributors to percent composition of all sampling dates. Cryptophyta was also important in January 1979.

3. Twenty-three taxa were dominant ($> 5\%$ occurrence at any station). This total included six blue-green, ten green, one cryptophyte and six diatom taxa.

ACKNOWLEDGEMENTS

This study was conducted under a contract with Consumers Power Company, Jackson, Michigan. The cooperation and support of Dr. Ibrahim Zeitoun, John Gulvas and Brad Latvaitis is greatly acknowledged. This paper represents report no. 4, Department of Biology-Limnological Services.

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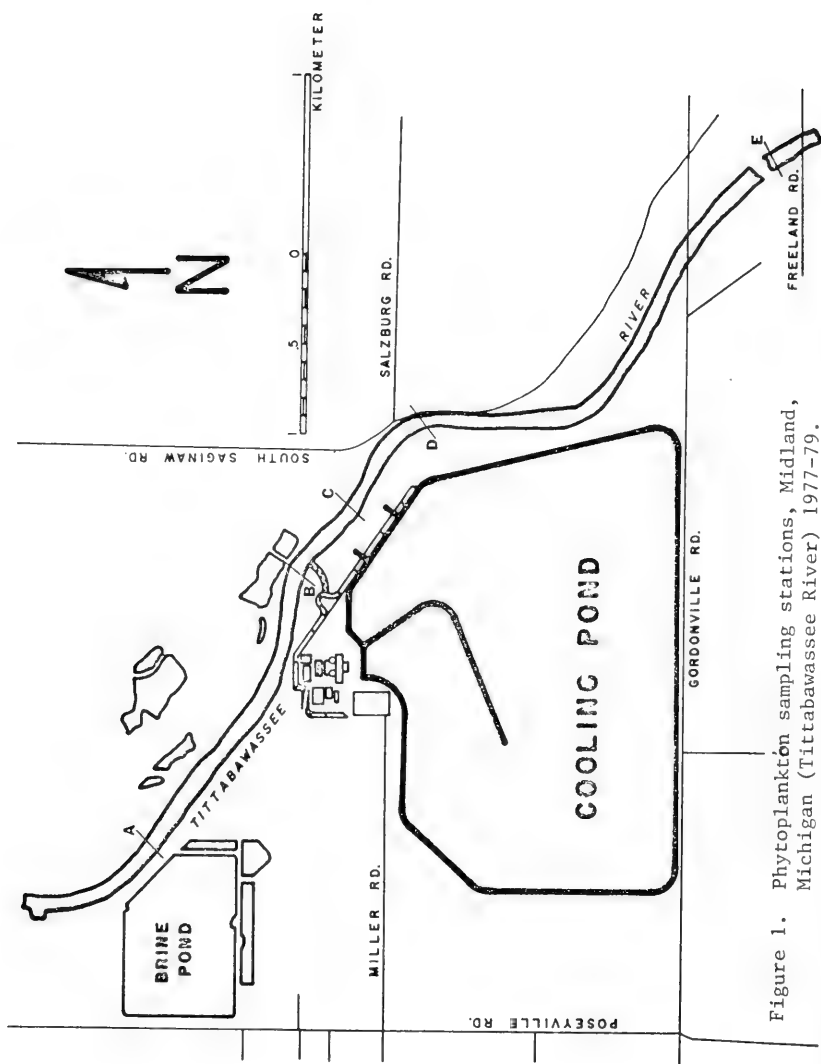


Figure 1. Phytoplankton sampling stations, Midland, Michigan (Tittabawassee River) 1977-79.

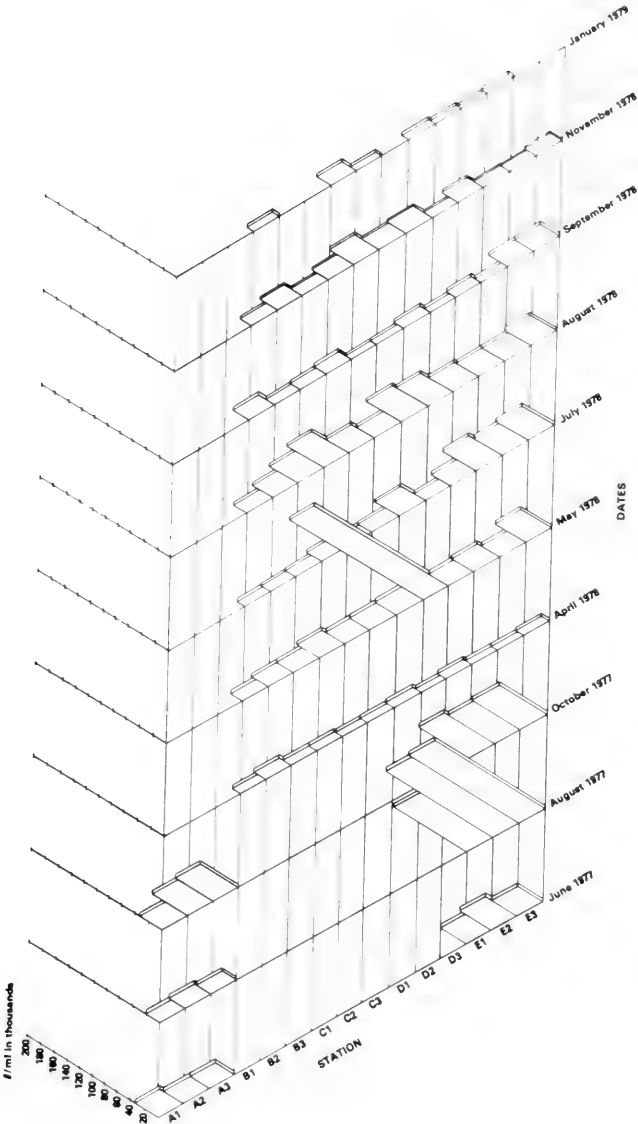


Figure 2. Seasonal variation of phytoplankton, Tittabawassee River, Midland, Michigan, 1977-79

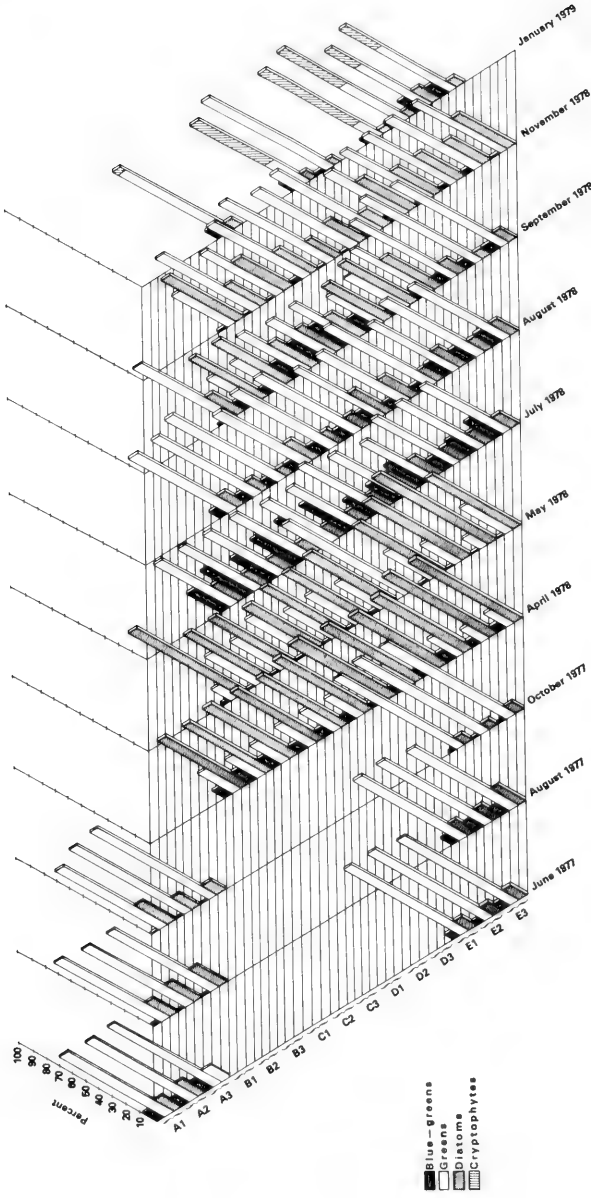


Figure 3. Percent distribution of phytoplankton, Tittabawassee River, Midland, Michigan, 1977-79.

Table 1. Summary of phytoplankton observed from the Tittabawassee River, Midland, Michigan, June 1977 - January 1979, arranged alphabetically within representative divisions.

Bacillariophyta

- *Attheya zachariasii J. Brun
- *Chaetoceros hohnii Wujek & Graebner
- *Coscinodiscus sp. 1
- *Cyclotella atomus Hust.
- Cyclotella comta (Ehr.) Kutz.
- *Cyclotella kuetzingiana Thwaites
- Cyclotella meneghiniana Kutz.
- *Cyclotella michiganiana Skv.
- *Cyclotella operculata (Ag.) Kutz.
- *Cyclotella pseudostelligera Hust.
- *Cyclotella stelligera Cl. et. Grun.
- *Melosira ambigua (Grun.) O. Mull
- *Melosira distans (Ehr.) Kutz.
- Melosira granulata (Ehr.) Ralfs
- *Melosira granulata var. angustissima (Ehr.) O. Mull
- Melosira varians Ag.
- Rhizosolenia eriensis H.L. Smith
- *Stephanodiscus astraia (Ehr.) H.L. Smith
- Stephanodiscus astraia var. minutula (Kutz.) Grun.
- *Stephanodiscus binderana (Kutz.) Round
- Stephanodiscus invisitatus Hohn & Hellerman
- Stephanodiscus niagarae Ehr.
- *Stephanodiscus subtilis (Van Goor) A. Cl.
- *Thalassiosira fluviatilis Hust.
- *Achnanthes clevei Grun.
- *Achnanthes conspicua A. Mayer
- *Achnanthes exigua Grun.
- *Achnanthes exigua var. constricta (Grun.) Hust.
- *Achnanthes flexella (Kutz.) Brun.
- Achnanthes haukiana Grun.
- *Achnanthes haukiana var. rostrata Schultz
- Achnanthes lanceolata Breb. ex. Kutz.
- Achnanthes lanceolata var. dubia Grun.
- *Achnanthes lemmermanni Hust.
- Achnanthes linearis fo. curta H.L. Smith
- Achnanthes minutissima Kutz.
- *Achnanthes sp. 4
- *Amphora bullatoides Hohn & Hellerman
- *Amphora coffeiformis (Ag.) Kutz.
- *Amphora ovalis (Kutz.) Kutz.
- *Amphora ovalis var. affinis (Kutz.) V.H. ex. DeT.
- *Amphora ovalis var. pediculus (Kutz.) V.H. ex. DeT.
- *Amphora perpusilla (Grun.) Grun.
- *Asterionella formosa Hass.
- *Caloneis amphisbaena (Bory) Cl.

Table 1. con't.

- *Caloneis bacillum (Grun.) Cl.
- *Cocconeis diminuta Pant.
- *Cocconeis disculus (Schum.) Cl.
- Cocconeis pediculus Ehr.
- *Cocconeis placentula Ehr.
- Cocconeis placentula var. euglypta (Ehr.) Cl.
- Cocconeis placentula var. lineata (Ehr.) V.H.
- Cocconeis thumensis Mayer
- *Cymatopleura elliptica (Breb.) W. Smith
- Cymatopleura solea (Breb.) W. Smith
- Cymbella affinis Kutz.
- *Cymbella cistula (Ehr.) Kirchn.
- *Cymbella microcephala Grun.
- *Cymbella minuta Hilse ex. Rabhn.
- *Cymbella muelleri var. ventricosa (Temp. & Perag.) Reim.
- **Cymbella prostrata (Berk.) Cl.
- *Cymbella tumida (Breb. ex. Kutz.) V.H.
- Diatoma tenue Ag.
- Diatoma tenue var. elongatum Lyngb.
- *Diatoma vulgare Bory
- *Diatoma vulgare var. breve Grun.
- *Diploneis puella (Schum.) Cl.
- *Epithemia adnata (Kutz.) Breb.
- *Epithemia adnata var. minor (Perag. & Herib.) Patr.
- *Eunotia praeupta var. bidens (Ehr.) Grun.
- *Fragilaria brevistriata var. capitata Herib.
- Fragilaria capucina Desm.
- *Fragilaria capucina var. mesolepta Rabhn.
- Fragilaria construens (Ehr.) Grun.
- *Fragilaria construens var. subsalina Hust.
- Fragilaria construens var. venter (Ehr.) Grun.
- Fragilaria crotonensis Kitton
- *Fragilaria leptostaurom (Ehr.) Hust.
- *Fragilaria leptostaurom var. dubia (Grun.) Hust.
- *Fragilaria pinnata Ehr.
- *Fragilaria pinnata var. intercedens (Grun.) Hust.
- *Fragilaria pinnata var. lanzettula (Schum.) Hust.
- Fragilaria vaucheria (Kutz.) Peters
- *Gomphonema ocuminatum (Ehr.)
- *Gomphonema angustatum var. citera (Hohn & Heller.) Patr.
- *Gomphonema gracile Ehr.
- Gomphonema olivaceum (Lyngb.) Kutz.
- Gomphonema parvulum (Kutz.) Kutz.
- *Gomphonema sphaerophorum Ehr.
- **Gomphonema tergestinum (Grun.) Fricke
- *Gyrosigma attenuatum (Kutz.) Rabhn.
- *Hantzschia amphyoxis (Ehr.) Grun.
- *Meridon circulare (Grev.) Ag.
- *Navicula anglica Ralfs

Table 1. con't.

- *Navicula anglica var. subsalsa Grun.
- *Navicula arrensis Hust.
- **Navicula atomus (Kutz.) Grun.
- *Navicula biconica Patr.
- Navicula capitata Ehr.
- Navicula capitata var. hungarica (Grun.) Patr.
- *Navicula cocconeiformis Greg. ex. Greg.
- *Navicula cryptocephela Kutz.
- Navicula cryptocephela var. veneta (Kutz.) Tabhn.
- *Navicula cuspidata (Kutz.) Kutz.
- Navicula decussis (Østr.) Kutz.
- *Navicula exigua Greg. ev. Grun.
- *Navicula gastrum (Ehr.) Kutz.
- *Navicula graciloides A. Mayer
- *Navicula gregaria Donkin
- *Navicula heufleri Grun.
- *Navicula heufleri var. leptocephela (Breb. ex. Grun.) Patr.
- *Navicula integra (W. Smith) Ralfs
- *Navicula lanceolata (Ag.) Kutz.
- *Navicula menisculus var. upsaliensis (Grun.) Grun.
- *Navicula minima Grun.
- *Navicula minuscula Grun.
- *Navicula muralis Grun.
- *Navicula mutica Kutz.
- *Navicula peregrina (Ehr.) Kutz.
- *Navicula placentula Ehr.
- *Navicula placentula fo. rostrata A. Amyer
- *Navicula protracta fo. elliptica Hust.
- *Navicula pupula Kutz.
- *Navicula pupula var. rectangularis (Greg.) Grun.
- *Navicula pupula var. rostrata (Kutz.) Hust.
- *Navicula pygmaea Kutz.
- *Navicula radiosa var. parva Wall.
- *Navicula radiosa var. tenella (Breb.) Grun.
- *Navicula reinhardtii (Grun.) Grun.
- *Navicula rhyncocephela Kutz.
- *Navicula salinarum Grun.
- *Navicula salinarum var. intermedia (Grun.) Cl.
- *Navicula scutelloides W. Smith ex. Greg.
- *Navicula simplex Krasske
- *Navicula tripunctata (O.F. Mull.) Bory
- *Navicula viridula (Kutz.) Kutz.
- *Navicula viridula var. rostellata (Kutz.) Cl.
- *Navicula vulping Kutz.
- *Nedium dubium (Ehr.) Cl.
- *Nedium dubium var. constrictum Hust.

Table 1. con't.

- *Nitzschia acicularis W. Smith
- *Nitzschia acicularis var. closteroides (Ehr.) W. Smith
- *Nitzschia acuta Hantz.
- *Nitzschia amphibia Grun.
- *Nitzschia angustata (W. Smith) Grun.
- *Nitzschia angustata var. acuta Grun.
- Nitzschia apiculata (Greg.) Grun.
- *Nitzschia capitellata Hust.
- Nitzschia dissipata (Kutz.) Grun.
- *Nitzschia filiformis (W. Smith) Hust.
- Nitzschia fonticola Grun.
- *Nitzschia frustulum Kutz.
- Nitzschia frustulum var. perpusilla (Rabhn.) Grun.
- Nitzschia gracilis Hantz.
- Nitzschia hungarica Grun.
- Nitzschia kutzingiana Hilse
- *Nitzschia linearis W. Smith
- *Nitzschia microcephala Grun.
- Nitzschia palea (Kutz.) W. Smith
- *Nitzschia paradoxa Kutz.
- *Nitzschia parvula Levis
- *Nitzschia recta Hantz.
- *Nitzschia sigma (Kutz.) W. Smith
- *Nitzschia sigmoideae (Ehr.) W. Smith
- *Nitzschia sinuata var. tabellaria Grun.
- *Nitzschia sublinearis Hust.
- Nitzschia thermalis
- *Nitzschia tryblionella Hantz.
- *Nitzschia tryblionella var. levidensis (W. Smith) Grun.
- *Nitzschia tryblionella var. victoriae Grun.
- *Nitzschia sp. 1.
- *Opephora martyi Herib
- *Plagiotropis lepidoptera var. proboscidea (Cl.) Reim.
- *Pleurosigma delicatulum W. Smith
- Rhoicosphenia curvata (Kutz.) Grun. ex. Rabhn.
- *Stauroneis smithii Grun.
- *Surirella ovalis Breb.
- Surirella ovata Kutz.
- Synedra acus Kutz.
- *Synedra delicatissima W. Smith
- *Synedra delicatissima var. angustissima Grun.
- *Synedra parasitica (W. Smith) Hust.
- *Synedra parasitica var. subconstricta (Grun.) Hust.
- *Synedra pulchella Ralfs ex Kutz.
- *Synedra radians Kutz.
- *Synedra rumpens Kutz.
- *Synedra rumpens var. familiaris (Kutz.) Hust.
- *Synedra tenera W. SMith

Table 1. con't.

- *Synedra ulna (Nitz.) Ehr.
 *Synedra ulna var. oxyrhynchus (Kutz.) V.H.
 *Synedra ulna var. ramesi (Herib) Hust.

Chlorophyta

- *Acanthosphaera "like"
 *Actinastrum hantzschii var. fluviatile Lemm.
Actinastrum sp. l.
Ankistrodesmus falcatus (Corda) Ralfs
Ankistrodesmus nannoselene Skuja
Ankistrodesmus spiralis (Turner) Lemm.
 *Asterococcus "like"
Chlorella vulgaris Beyer
 *Coelastrum microporum Naeg.
 *Coelastrum proboscideum Bohlin
 *Coelastrum sphaericum Naeg.
Crucigenia quadrata Morren
Crucigenia tetrapedia (Kirch.) West & West
Dictyosphaerium pulchellum Wood
Elakatothrix gelatinosa Wille
 *Gloeocystis vesciculosa Naeg.
 *Micractinium pusillum Fres.
Oocystis pusilla Hansg.
 *Palmodictyon varium (Naeg.) Lemm.
Pediastrum boryanum (Turp.) Meneghini
 *Pediastrum duplex var. clathratum (A. Brown) Lag.
Pediastrum duplex var. gracilimum West & West
 *Pediastrum duplex var. reticulatum Lag.
Pediastrum tetras (Ehr.) Ralfs
 *Pediastrum tetras var. tetraodon (Corda) Rabhn.
 **Planktosphaeria gelatinosa G.M. Smith
 *Polyedriopsis quadrispina G.M. Smith
 **Quadrigula lacustris (Ched.) G.M. Smith
Scenedesmus abundans var. longicauda G.M. Smith
Scenedesmus acuminatus (Lag.) Chodat
 *Scenedesmus armatus var. chodatii G.M. Smith
Scenedesmus bijuga var. alternans (Rein.) Hansg.
Scenedesmus bijuga (Turp.) Kutz.
 *Scenedesmus denticulatus Lag.
 *Scenedesmus dimorphus (Turp.) Kutz.
 *Scenedesmus opoliensis P. Richter
Scenedesmus quadricauda (Turp.) Breb.
 *SB (unknown green coccoid)
 *Tetraedron gracile (Rein.) Hansg.
 *Tetraedron incus (Teil.) G.M. Smith
 *Tetraedron minimum (A. Brown) Hansg.
Tetraedron penaedricum W. & G. M. Smith
Tetraedron trigonum (Naeg.) Hansg.

Table 1. con't.

- *Tetraedron heteracanthum (Nordst.) Chodat
- *Tetraedron staurogeniaeforme (Schroeder) Lemm.
- *Treubaria sertigerum (Archer) G.M. Smith
- **Arthrodesmus sp. 1.
- Closterium sp. 1.
- Closterium sp. 2.
- *Closterium sp. 3.
- *Closterium sp. 4.
- *Cosmarium sp. 1.
- *Cosmarium sp. 2.
- *Mougeotia sp. 1.
- *Stigeoclonium nanum Kutz.
- *Carteria sp. 1.
- Chlamydomonas snowii Printz
- *Chlamydomonas sphagnicola Fritsch & Takeda
- *Chlamydomonas sp. 1.
- Eudorina elegans Ehr.
- Pandorina morum (Muell.) Bory

Chrysophyta

- *Chrysosphaerella longispina Lemm.
- Dinobryon bavaricum Imhof
- Dinobryon divergens Imhof
- *Kephyrion sp. 1.
- *Mallomonas monograptus Harris & Bradley
- *Paraphysomonas vestita de Stokes
- *Perionella planktonica G.M. Smith
- *Salpingoeca frequentissima (Zach.) Lemm.

Cryptophyta

- *Chroomonas nordstedtii Hansg.
- **Cryptomonas erosa Egr.
- *Rhodomonas minuta var. nanoplanktica Hall

Cyanophyta

- *Aphanocapsa elachista West & West
- Aphanothece sp. 1.
- Chroococcus dispersus (Kersel.) Lemm.
- Chroococcus limneticus Lemm.
- Chroococcus minor (Kutz.) Naeg.
- *Chroococcus pallidus Naeg.
- *Chroococcus turgidus (Kutz.) Naeg.
- Dactylococcopsis fascicularis Lemm.
- **Dactylococcopsis raphidioides Hansg.

Table 1. con't.

- Gloeocapsa aeruginosa (Carm.) Kutz.
 *Gomphosphaeria lacustria Chodat
 *Merismopedia elegans (A. Braun) Kutz.
 **Merismopedia glauca (Ehr.) Naeg.
Merismopedia tenuissima Lemm.
 *Microcystis aeruginosa Kutz. emend. Elenkin
Microcystis incerta Lemm.
Anabaena sp. 1.
Anabaena sp. 2
 *Anabaena sp. 3.
Lyngbya diguetii Gomot
Oscillatoria subbrevis Schmidle
 *Oscillatoria tenuis Ag.

Euglenophyta

- *Euglena elongatum Schewiakoff
Euglena sp. 1.
 *Euglena sp. 2.
 *Euglena sp. 3.
Phacus sp. 1.
 **Phacus sp. 2.
Trachelomonas sp. 1.

Pyrrophyta

- Ceratium hirundinella (O.F. Mull.) Duj.
 *Peridinium sp. 1.

Xanthophyta

- *Botryococcus sp. 1.
 *Stipitococcus vasiformis Tiff.

* = observed in 1978-79 only
 ** = observed in 1977 only
 No asterix = observed 1977-79

NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXV

Harold N. Moldenke

PAEPALANTHUS SCANDENS var. *ALMASENSIS* Mold., var. nov

Haec varietas a forma typica speciei recedit foliis majoribus coriaceis usque ad 1 cm. longis basin 2 mm. latis pedunculis longioribus usque ad 15 cm. longis et capitulis plerumque proliferantibus.

This variety differs from the typical form of the species in its larger, heavier (coriaceous) leaves, which are to 1 cm. long toward the apex of the stems (smaller below) and there to 2 mm. wide at the base, very stiff and greatly recurved, the peduncles much longer, to 15 cm. long, and the fruiting-heads often proliferating into leaves and/or secondary long-stipitate heads.

The variety is based on *Harley, Mayo, Storr, Santos, & Pinheiro in Harley 19725*, described by the collectors as an erect herb, to 1 m. tall, the leaves coriaceous, recurved, the involucral bracts dark, and the flowers white, and collected among long grass on the slope of the summit ridge of Pico das Almas, about 25 km. west-northwest of the Vila do Rio de Contas, in an area of sandstone conglomerate metamorphic and quartzite rock outcrops with associated scrubby vegetation with damp flushes, grassland and marsh in some areas, approximately 41°57' W., 13°33' S., Serra das Almas, Bahia, Brazil, at 1600--1850 m. altitude, on March 19, 1977.

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ADDITIONAL NOTES ON THE GENUS *CONGEA*. II

Harold N. Moldenke

CONGEA TOMENTOSA Roxb.

Additional bibliography: Mold., *Phytologia* 45: 210--216. 1980.

Menninger (1970) asserts that "Usually the bracts [of this species] acquire color in late October [in Florida], become brilliant in the beginning of the new year, then gradually darken until March or April, when the new growth starts. If no seeds are produced, propagation may be effected by stem cuttings, though they tend to root with difficulty." He notes that other cultivated taxa of this genus are var. *nivea* Munir "with more ashy-white pubescence", *C. vestita* W. Griff. with "its individual flowers stalked, and the floral bracts.....often deeply notched at their apex", and *C. griffithiana* Munir "with four spatulate or oblanceolate bracts".

Pal & Krishnamurthi (1967) assert that "The plant is more

easily propagated from seeds than cuttings". Woodrow (1910) says that "It thrives in a moist atmosphere, and at Madras becomes 'one blaze of colour with flowering branches one foot in length' (Agri.-Horti. Soc. Report). It is difficult to propagate, and is rare in gardens: layers root tardily, and cuttings in pots with clean sand protected by a bell glass and placed in a shaded frame root fairly."

MacMillan (1913) states that *Congea tomentosa* "is a comparatively recent introduction from Burma, its native home, and in beauty and charm of blossom rivals the most beautiful of flowering climbers. It bears large loose sprays of inflorescence which remain bright and unfaded for several weeks. Like some other well-known favourites, the showy part consists, not of the actual flower but of the bright coloured persistent bracts subtending the flowers. At first of a delicate pink shade, these gradually merge into lighter tints of pleasing contrast. The plant obviously deserves a place in every garden, and will thrive from sea-level to about 3,000 feet elevation. It has not as yet produced seed at Peradeniya [Sri Lanka], but may be propagated with comparative ease if cuttings of the mature wood are inserted in a bed of light sandy soil, during the wet season, and kept shaded and moderately moist." Steiner (1952) asserts that flowering [in the Philippines] lasts from November to March and propagation is by cuttings and layering. He describes the bracts as mauve and spatulate so it is possible that the reference is to *C. griffithiana* rather than to *C. tomentosa*.

Cowen (1950) avers that if only the flower sprays are cut, they will last many days in water, but if the stem is cut along with the flower sprays, it will droop and quickly die.

Gibbs (1974) reports the absence of syringin in the stems of *Congea tomentosa* and negative results with the HCl/methanol test. The pollen is described by Rehman (1962). The chromosome number is reported by Sharma & Mukhopadhyay (1963), Cave (1964), and Bolkskikh & al. (1969) as $2n = 34$, but Rao (1961) reports $n = 18$. Norman R. Farnsworth, in a letter to me dated March 1, 1971, states that "phytochemical screening showed the presence of saponins, but triterpenes, sterols and alkaloids were absent".

Schauer (1847) recognized two varieties under *C. tomentosa* which he distinguished as follows: "*Α. latifolia*, foliis subrotundo-ellipticis (3--4 uncias longis, 2 1/2 -- 3 poll. latis) subabrupto acuminatis, involucri phyllis calycibusque paulo majoribus" [the typical form, based on Wallich's no. 1733/2 from Prome, Upper Burma, in 1826] and "*Β. oblongifolia*, foliis oblongis (4--6 poll/ long., 2 poll. latis) coarctato-acuminatis, involucri phyllis calycibusque paulo minoribus" [the *C. azurea* Wall. & *Roscoeia villosa* Roxb. form, based on Wallich's no. 1733/1, from Martaban, Lower Burma]. Munir (1966) synonymizes both names under typical *C. tomentosa*.

Roth (1977) notes that "The dry subtending bracts of the flowers of *Congea tomentosa* corresponding at the same time to the prophylls of the partial inflorescences produce a rotary movement of the falling diaspores, since the inflorescence detaches as a dis-

persal unit together with the bracts. The prophylls, with a velvety surface, develop a few layers of a spongy mesophyll parenchyma and a small-celled upper and lower epidermis tightly beset with long ramified hairs. The armed cells of the mesophyll leave large intercellular spaces between them which reduce the specific weight of the diaspore."

Watt (1889) claims that "in Coromandel....it flowers in the cold season, the Chittagong plant flowering in March". He asserts that var. *azurea* "is cultivated in North India".

Altschul (1973) reports the roots of an unidentified species of *Congea* used as a laxative -- judging from the specimen cited this statement doubtless refers to *C. tomentosa*.

While most authors on cultivated plants credit *C. tomentosa* as having been introduced from Burma, Graf (1963) credits it as from India. Corner & Watanabe (1969) ambiguously say "*Congea tomentosa* Roxb. = *C. griffithiana* Munir" -- their accompanying illustration appears to be of *C. griffithiana*.

Clarke (1885) cites Roxburgh s.n. [Chittagong] and Griffith 6013 from Bangladesh and Burma, respectively, as *C. tomentosa*, "Wallich, McLelland, &c." from Burma as *C. tomentosa* var. *azurea*, and Roxburgh s.n. [Rangoon] and Griffith 6012 (in part) from Burma as *C. villosa*.

Diels (1913) cites Forrest 1144; Hallier (1918) cites Hosséus 370. Munir (1966) cites the following: BANGLADESH: Cowan 244, 802, 1679, 1899, 2377, & s.n.; Lace 2176; Lister 89. INDIA: Assam: Parry 609. Manipur: Watt 5055 & 5105. BURMA: Central & Upper: Anderson s.n.; Aubert & Gage s.n.; Forrest 1144, Fulton s.n. [Watt 10770]; Haines 5776; Huk 208 & s.n.; Kan 260; King s.n.; Kingdon-Ward 21729; MacGregor 1120; Maunders s.n.; McKee 5986; Mc Millan 20; Mokim 25 & s.n.; Mundul 86; Parkinson 15700; Pottinger s.n.; Prazer 36; Rock 1691 & 1923; Rogers 597; Watt 16. Insein: Kan 270; Khant 82. Martaban: Amherst s.n. [Wallich 1733, 1733a, & 1733/1]; Beddome 6531, 6533, & s.n.; Dickson 6869; Falconer 2; Helfer 28, 53, & 6013; Loble s.n. Pegu: Brandis 878 & 880; Collector undetermined 429; Kurz 1039 & 2398; McLelland s.n. Prome & Karenni: Chin 4366; Collector undetermined s.n.; Dickson 6927; Lace 2724; Toppin 2557. Rangoon: Collector undetermined 104 & s.n.; Dickson 3142 & 5662; McLelland s.n.; Meebold 14047; Parkinson 13930; Weiste X.P.L.I. Tenasserim: Gallathy 13; Griffith 6013. THAILAND: Bunpheng 472; Collins 359; Hosseus 370; Kasin 162, Kerr 533, 6368, & s.n.; Larsen & Hansen 6636; Nakkarn 82; Native collector 3810; Put 2283; Vanpruk 163. INDOCHINA: Laos: Pételot 1539; Spire 749 & s.n.. Vietnam: Annam: Poilane 19977. CHINA: Yunnan: Anderson s.n.; Forrest 29388; Wang 72678. CULTIVATED: Burma: Bernard X.P.L.I. Cuba: Eames s.n.; Jack 8486. Florida: Boom 38552; Moore 6007. Haiti: Ekman 9963. India: Balapure s.n.; Erlanson 5368; Griffith 9331; Herb. Bot. Calcutt. s.n.; Herb. Wight s.n.; Raizada s.n.. Java: Herb. Hort. Bogor. XV.E.70 (in part). New York: H. N. Moldenke 9454 (in part). Puerto Rico: Britton & Boynton 8165. Singapore: Deshmukh s.n.; Furtado s.n.; Noor s.n.

According to Munir (1966) part of H. N. Moldenke 9454 in the

New York Botanical Garden herbarium is *C. tomentosa* and part is *C. vestita*.

Material of *C. tomentosa* has been misidentified and distributed in some herbaria as *C. siamensis* Fletcher, *C. vestita* W. Griff., and *Sphenodesme* sp. On the other hand, the Tsai 52611, distributed as *C. tomentosa*, is the type collection of *C. chinensis* Mold.; Rivera s.n. [Philip. Nat. Herb. 33460] and Steiner 597 [Philip. Nat. Herb. 22931] are *C. griffithiana* Munir; Rock 1677 is the type collection of *C. rockii* Mold.; H. M. Smith 314 is *C. siamensis* Fletcher; Bunpheng 1126 [Herb. Roy. Forest Dept. 21137], Collins 2073, Lindhard s.n. [19 Jan. 1904], Pierre s.n. [Cochinchine] & s.n. [ad flum. Dong Nai], and Thorel 648 are *C. tomentosa* var. *nivea* Munir; W. Lee LASCA.923 and Moldenke & Moldenke 19799 are *C. velutina* Wight; while Moldenke & Moldenke 10408 and Pierre s.n. [2/1877] are *C. vestita* W. Griff.

Citations: COSTA RICA: San José: Sieger s.n. [San José, summer 1936] (N). JAMAICA: D. Hummel s.n. [10/4/1958] (S). HISPANIOLA: Dominican Republic: Liogier & Liogier 24710 (N). PUERTO RICO: Otero M.86 (Mi). COLOMBIA: Antioquia: Daniel 3884 (W--1907047). INDIA: Assam: Chand 6869 (Mi); Koelz 27609 (Mi). Madras: Kuria-kose s.n. [12-1-33] (N). West Bengal: J. M. Cowan 2378 (It); Helfer 28 (B, Bt--40758, Bz--20961, Gg--267598, Go, Gz, I, Mu, N, S, W--1668972); Mukherjee s.n. [15.12.68] (Ld). State undetermined: Voigt s.n. BURMA: Martaban: Helfer 6013 (Mu--1064, S). Shan States: Rock 1923 (Ca--264325, W--1214650). Tenasserim: Bêlanger 218 (Du--166402). Upper Burma: J. Anderson s.n. [23/1/68] (Mu--3805); Huk 47 (W--369350); King's Collector s.n. [Mak-haye Hill] (Bz--20962); J. R. McMillan 201 (Ca--745115, Mi, W--1864419). Province undetermined: Luxburg s.n. [23.2.1903] (Mu); Rock 774 (W--1171461), 784 (W--1171469); Shaik Mokim 25 (Br). THAILAND: Beusekom & Phengkhilai 87 (Ac); Bunchuai 807 [Herb. Roy. Forest Dept. 24026] (Gg); Charoenphol, Larsen, & Warncke 4483 (Ac, N), 4508 (Ac); Cheviwat & Nimanong 21 (Ac); Cockerell s.n. [Nan] (W--1372352); Collins 359 (W--1700525); Dee 472 [Herb. Roy. Forest Dept. 7345] (Z), 518 [Herb. Roy. Forest Dept. 7742] (Ss); Gram & Syrach-Larsen 114 (Cp); Hossêus 370 (Mu--4191, V), 371 (Mu--4193), 386x (Mu--4192); Lindhard s.n. [19 Jan. 1904] (N, S); Phenklai, Nimanong, & Singhasthit 3041 (Ac); Phloenchit 78 [Herb. Roy. Forest Dept. 10692] (Ss); Rock 1691 (W--1213305); Sørensen, Larsen, & Hansen 6636 (Bm); Surapat 42 (W--2450888). INDOCHINA: Cochinchina: Pierre s.n. [2/1877] (B), s.n. [1877] (B), s.n. (B). Laos: Pételot 1539 (Ca--236744); Spire 749 (B). Vietnam: Poilane 11674 (B). MALAYA: Kedah: Kadir 35802 (Bz--72779), 35803 (Bz--72778). CULTIVATED: Bangladesh: Zeyauddin 148 (Kh). Colombia: Duque 1595 (N, W--1744505). Costa Rica: Kupper s.n. (Mu). Cuba: Acuña 15996/16220/16513 (Es); Dahlgren s.n. [March 30, 1950] (W--2159350); Eames s.n. [Soledad, March 7, 1948] (Ca--772702); J. G. Jack 8486 (Du--357471, N, Pd, W--1556245). Dominica: L. H. Bailey 747 (Ba, Ba); Hodge 3654 (Ms). Dominican Republic: B. Augusto 646 (N). Florida: Fairchild Trop. Gard. 2150 (Ft); Gillis 7564 [Fairchild Gard. 59-759] (Ac, Ba); H. E. Moore 6007 (Ba); O'Neill s.n. [Feb. 28, 1933] (I); Sheehan R.23 (Ba).

Haiti: *Buch s.n.* [Ekman H.9963] (Ld, N, W--1413839); *S. B. May s.n.* [1935] (N). Honduras: *Boghdan & Barkley 39438* (Ac); *Pfeifer 1739* (W); *Yuncker 4787* (Dp). India: *Erlanson 5368* (Mi, N); *Herb. Hort. Bot. Bogor. s.n.* (T); *Herb. Hort. Bot. Calcutt. s.n.* (Bz--20963, Mu--1063, Mu--1168, Mu--1169, Pd, T). Jamaica: *L. H. Bailey s.n.* [April 2, 1948] (Ba). Java: *Herb. Hort. Bot. Bogor. XV.E.3* (Bz--26256, Bz, Bz, N), *XV.E.70 in part* (Bz--26275, Bz, Bz, N), *s.n.* (Bz--72775, Bz--72776, Bz--72777, Er); *Herb. Hort. Tuinherb. s.n.* [1905] (S). Martinique: *Stehlé & Stehlé 4311* (W--2453708). New York: *Boynton s.n.* [N. Y. Bot. Gard. Cult. Pl. 54967] (N); *H. N. Moldenke 8420* [N. Y. Bot. Gard. Cult. Pl. 5496] (N), *9454 in part* (Ar, Ba, Bm, Br, Br, Cm, E, Go, Ml, N, Nd, Po, St, Ur). Panama: *Moldenke & Moldenke 19799* (N); *F. Nelson s.n.* [10 April 1976] (Ld, Uw). Philippines: *M. L. Steiner s.n.* [Philip. Nat. Herb. 22931] (Mg). Puerto Rico: *Britton & Boynton 8164* (N); *Howard & Nevling 16914* (Ba); *R. J. Wagner 762* (S). Singapore: *Furtado s.n.* [Nov. 15, 1927] (Ca--343101); *Nur s.n.* [25 Dec. 1924] (Ba). Sri Lanka: *F. W. De Silva 4* (Pd). Tobago: *L. M. Andrews 3-50* (N). Trinidad: *W. E. Broadway 6891* (Um--140, W--1411459); *Friend 88* (N). Venezuela: *Croizat 2* (N, Ve); *Lasser 3466* (Ve--36915); *Skog 1224* (W--2705159); *Valero & Rice V.40* (Ld, Ld).

CONGEA TOMENTOSA var. *NIVEA* Munir, Gard. Bull. Singapore 21: 310--312, fig. 10a. 1966.

Synonymy: *Congea oblonga* Pierre in Dop, Bull. Soc. Bot. France 61: 320--321. 1915. *Congea peteloti* Mold., Phytologia 3: 409. 1951. *Congea alba* Harler, Gard. Plains, ed. 4, 185. 1962. *Congea tomentosa* "Roxb. sec. Fletcher" apud Munir, Gard. Bull. Singapore 21: 310, in syn. 1966 [not *C. tomentosa* Roxb., 1819]. *Congea velutina* "Wight sec. Dop" apud Munir, Gard. Bull. Singapore 21: 310, in syn. 1966 [not *C. velutina* Wight, 1849]. *Congea vestita* "Griff. sec. Dop" apud Munir, Gard. Bull. Singapore 21: 310, in syn. 1966 [not *C. vestita* W. Griff., 1854]. *Congea oblonga* Dop apud Munir, Gard. Bull. Singapore 21: 310, in syn. 1966.

Bibliography: Dop, Bull. Soc. Bot. France 61: 320--321. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 65. 1921; Dop in Lecomte, Fl. Gén. Indochine 4: 908 & 910. 1936; Fedde & Schust, Justs Bot. Jahresber. 60 (2): 572. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59 & 92 (1942) and ed. 2, 136 & 173. 1949; Mold., Résumé 175 & 439. 1959; G. Taylor, Ind. Kew. Suppl. 12: 38. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 65. 1960; Harler, Gard. Plains, ed. 4, 185. 1962; Mold., Résumé Suppl. 5: 6 (1962) and 12: 7. 1965; Munir, Gard. Bull. Singapore 21: 267, 269, 275, 276, 305, & 310--314, map 2, fig. 10a. 1966; Mold., Résumé Suppl. 15: 10, 15, & 20 (1967) and 16: 13. 1967; Munir, Biol. Abstr. 48: 5018. 1967; Mold. in Menninger, Flow. Vines 328. 1970; Mold., Fifth Summ. 1: 295, 300, 361, 468, & 469 (1971) and 2: 843. 1971; Mold., Phytologia 45: 56, 57, 59--61, 211, & 216. 1980.

Illustrations: Munir, Gard. Bull. Singapore 21: 311, fig. 10a. 1966.

This variety is said to differ from the typical form "by its branchlets and inflorescence axis being cinereo-tomentose even when young, involucre bracts obovate or broadly elliptic, white-tomentose, sometimes tinged mauve when fresh. Calyx cinereo-pubescent without, lobes one-third the length of the calyx-tube or shorter with no accessory teeth; corolla with a broader villous band in the throat". It is based on *Noor & Munir* 5, collected in the Botanical Garden at Singapore.

Harler's *C. alba* is described by him as "a white variety of *C. tomentosa*" and I am assuming that it belongs here. *Congea oblonga* Pierre is based on *Pierre* 5229 from Kam-pot, Cambodia. Dop says of it: "Cette espece parait voisine, par son appareil vegetatif, du *C. Forbesii* King et Gamble, de Sumatra. Elle s'en distingue par l'absence de bracteoles lineaires, le calice beaucoup plus long, tomenteux et non villeux". *Congea petelotii* Mold. is based on *Pételot* 3852a from Thom, Tonkin [Vietnam].

Recent collectors describe this plant as a woody climber or a shrub, 1.5 m. tall, abundantly flowering, "the whole inflorescence beautiful pink", the bracts whitish above, greenish beneath, and the stamens maroon. They have found it growing along roadsides and in thickets on sandy calcareous soil, at 100--600 m. altitude, in flower in January, March, and November. The corollas are said to have been "white" on *Bunpheng* 1126, "greenish" on *Phengkhlai* 554, and "white with maroon dots" on *Maxwell* 74-1088.

In Thailand Phengkhlai reports the plant "scattered" in dry evergreen forests on hillsides; Lindhard found it "very common in the mountains"; Bunpheng says that it is "common" in deciduous forests, while Maxwell reports it "abundant in the deciduous forest canopy".

It should be noted that the Dop (1936) reference in the bibliography (above) is often cited, but apparently erroneously, as "1935", while his 1915 reference is sometimes cited as "1914", but a footnote on the titlepage plainly indicates that the work was not actually issued until 1915.

Munir (1966) cites the following collections: THAILAND: *Collins* 2073, *Kerr* 9516, *Lakshnakara* 491, *Marcan* 1072 & 1550, *Put* 2101. CAMBODIA: *Evrard* 2459, *Poilane* 14639 & 23271. LAOS: *Joseph s.n.*, *Pételot* 3852 & 3853. VIETNAM: Annam: *Poilane* 11695. Cochinchina: *Poilane* 2413. CULTIVATED: Java: *Dilmy s.n.*, *Herb. Bot. Gard. Bogor*. X.G.62, XV.E.78, XV.E.78a, *Soepadmo* 1. Singapore: *Furtado s.n.*, *Holtum s.n.*, *Munir* 4, *Noor & Munir* 5. He suggests that *C. vestita* var. *subvestita* Munir may represent a natural hybrid between this species and *C. vestita* W. Griff.

Citations: THAILAND: *Beusekom & Phengkhlai* 2573 (Ac); *Bunpheng* 1126 [Herb. Roy. Forest Dept. 21137] (Z); *Collins* 2073 (W--1701665); *Lindhard s.n.* [19 Jan. 1904] (Mu--4194); *Maxwell* 74-1088 (Ac); *Phengkhlai* 554 [Herb. Roy. Forest Dept. 28432] (Cp). LAOS: *Pételot* 3852 (N). VIETNAM: Annam: *Poilane* 11695 (B, Ca--53769). Cochinchina: *Pierre s.n.* [ad flum. Dong Nai] (Bz--72805, S), *s.n.* [Bavia] (Ca--53764), *s.n.* [Cochinchine] (Bz--72804, Ca--53766, S); *Poilane* 2413 (B); *Thorel* 648 (B, Bz--72929, Ca--38890, S). South Vietnam: *R. M. King* 5637 (W--2436032). Tonkin: *Pételot*

3852a (N).

CONGEA VELUTINA Wight, Icon. Pl. Ind. Orient. 4 (3): 15. 1849[not *C. velutina* "Wight sec. Dop", 1966].

Synonymy: *Congea velutena* Wight, Icon. Pl. Ind. Orient. 4 (3): pl. "1479/3 or 1566". 1849. *Congea tomentosa* Hall. f. ex Mold., Alph. List Inv. Names Suppl. 1: 8, in syn. 1947 [not *C. tomentosa* Cooke, 1921, nor King & Gamble, 1921, nor Roxb., 1819, nor "Roxb. sensu King & Gamble", 1966, nor "Roxb. sec. Wight", 1960, nor "Roxb. sec. Fletcher", 1966, nor R. & B., 1979]. *Congea tomentosa* var. *velutina* (Wight) Bakh. ex Mold., Résumé 275, in syn. 1959. *Congea velutinus* Wight ex Mold., Phytologia 23: 430, in syn. 1972.

Bibliography: Wight, Icon. Pl. Orient. 4 (3): 15, pl. "1479/3 or 1566". 1849; Wight, Illustr. Ind. Bot. 2: pl. 173 bis. 1850; C. B. Clarke in Hook. f., Fl. Brit. India 4: 603. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893; Gamble, Man. Indian Timb., ed. 2, imp. 1, 545. 1902; C. B. Clarke in J. Schmidt, Bot. Tidsskr. 26: 174. 1904; Brandis, Indian Trees, imp. 1, 513. 1906; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 100 & 101. 1921; Gamble, Man. Indian Timb., ed. 2, imp. 2, 545. 1922; Ridl., Dispers. Pl. World pl. 6. 1930; Stapf, Ind. Lond. 2: 277. 1930; Engles.-Julius, Tuin. Wagen. Ind. Laagulakte 47. 1932; Dop in Lecomte, Fl. Gen. Indo-chine 4: 908--910 & 912, fig. 94 (3) & 95 (1--3). 1936; Worsdell, Ind. Lond. Suppl. 1: 248. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 54, 55, 61, 63, 73, & 92. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595. 1946; Mold., Alph. List Inv. Names Suppl. 1: 8. 1947; Neal, In Gard. Hawaii, ed. 1, imp. 1, 635, 645, & 774 (1948) and ed. 1, imp. 2, 635, 645, & 774. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 126, 129, 139, 143, 160, & 173. 1949; Mold., Résumé 142, 161, 165, 179, 188, 190, 193, 217, 275, & 439. 1959; Jacks in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595. 1960; Mold., Résumé Suppl. 3: 20 & 28. 1962; R. Good, Geogr. Flow. Pl. 210. 1964; Backer & Bakh., Fl. Java 2: 612 & 613. 1965; Neal, In Gard. Hawaii, ed. 2, 720, 732, & 885. 1965; Munir, Gard. Bull. Singapore 21: 263, 267, 272, 275, 276, 279, 296--298, 313, & 314, map 5, fig. 6 (1966) and 22: 158. 1967; Mold., Résumé Suppl. 15: 7, 9, 15, & 20. 1967; Backer & Bakh., Fl. Java 3: 657. 1968; Keng, Ord. Fam. Malay. Seed Pl. 280. 1969; Van der Pijl, Princip. Dispers. Higher Pl., ed. 1, 57--58. 1969; Menninger, Flow. Vines 49. 1970; Brandis, Indian Trees, imp. 2, 513. 1971; Mold., Fifth Summ. 1: 273, 283, 295, 305, 323, 361, 468, & 469 (1971) and 2: 843. 1971; Gamble, Man. Indian Timb., ed. 2, imp. 3, 545. 1972; Mold., Phytologia 23: 423 & 430. 1972; Van der Pijl, Princip. Dispers. Higher Pl., ed. 2, 57. 1972; Mold., Phytologia 28: 449. 1974; O. & I. Degener, Hawaii. Pl. Names x. 1975; Mold., Phytologia 34: 269. 1976; Clay & Hubbard, Haw. Gard. Trop. Shrubs 185 & 288. 1977; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 44. 1978; Mold., Phytologia 45: 56--59, 61, 210, & 216. 1980.

Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. "1479/

3 or 1566". 1849; Wight, *Illust. Ind. Bot.* 2: pl. 173 bis. 1850; Ridl., *Dispers. Pl. Through. World* pl. 6. 1930; Engles-Julius, *Tuin. Wegen Ind. Laagvlakke* 47. 1932; Dop in Lecomte, *Fl. Gen. Indo-chine* 4: 909 & 912, fig. 94 (3) & 95 (1--3). 1936; Munir, *Gard. Bull. Singapore* 21: 297, fig. 6. 1966.

Recent collectors describe this plant as a large, scandent or somewhat scandent-climbing shrub, 2 m. tall, or as an attractive ornamental vine, the wood tan-brown, the leaves dark-green, velutinous beneath, the 4 bracts very conspicuous and showy, rounded at their apex and obovate-spatulate in shape, "profuse and most colorful", velvety in texture, grayish-white or lavender to pink, lilac, or magenta, the calyx yellowish-green, shortly 5-fid, the "teeth not short and obtuse", the corolla 2-lipped, exserted, "sparsely glabrous [=subglabrous?] outside", densely villous in the throat, the filaments pink, and the anthers orange. They have found it growing in semi-moist ground, flowering from January to March, as well as in September and November. Pancho reports that it is a "popular ornamental vine in the Philippines". Van der Pijl (1969) asserts that "colored wings develop from the bracts [and] first collaborate in attracting animals for pollination, then [later on serve] for dispersal [of the seeds]".

The "flowers" [corollas? bracts?] are said to have been "purple" on *Inafuku s.n.*, "white, pink at base" on *Soepadmo 1*, and "purple except for white lobe-margins and base of tube" on *Furtado s.n.*

Vernacular names reported for this species are "lau-huila-ho'one'e", "molentjes bloem", "pink sandpaper vine", and "propellerplant".

The *Congea tomentosa* credited to King & Gamble and to "Roxb. sensu King & Gamble" in the synonymy (above) applies to *C. griffithiana* Munir, while *C. tomentosa* "Roxb. sec. Wight" applies to *C. vestita* W. Griff.

Backer & Bakhuizen (1965) give the natural distribution of *C. velutina* as "native to Further India and Malay Peninsula". In Java it is said to be a common ornamental "from 1--800 m." altitude. Clarke (1885) cites only *Griffith 838* from the Mergui Archipelago and *Helper 6012* from Tavoy, Burma. Munir (1966) cites *Helper 6012* & *s.n.* and *Parker 2579* from the Mergui Archipelago and *Hamid 3769*, *Keith 2*, and *Kloss 6703* from Thailand. The species is widely cultivated and appears to have escaped and become naturalized in Indonesia and Zaire.

Material of *C. velutina* has been misidentified and distributed in some herbaria as *C. tomentosa* Roxb., *C. villosa* Wight, and *Symphorema luzonicum* (Blanco) Fern.-Villar. On the other hand, the *Herb. Hort. Bot. Bogor. XII.B.IX.53*, *XV.E.1*, *XV.E.71*, & *XV.E.71a*, *Pancho 204*, and *Whistler W.843*, distributed as *C. velutina*, actually are *C. griffithiana* Munir.

Citations: ZAIRE: *Goossens 4511* (Br, Br, N). BURMA: *Wallich 1733* (Pd). MERGUI ARCHIPELAGO: *Parker 2579* (Ca--358719). THAILAND: *Bogner 419* (Mu); *J. Schmidt 433* (Mu--4195); *H. M. Smith 314* (Ca--926534); *Snan 913* [Herb. Roy. Forest Dept. 16175] (Bk). GREATER SUNDA ISLANDS: Borneo: *Tatong 2000* (Bz--20965, Le--

92266-32). Java: *Bakhuizen van den Brink* 285 (Bz--20970, Le--92266-91, Ut--63814); *Brinkman* 480 (Bz--20972); *Veldhuis* 62 (Ut--66590a); *Visser* C.90401 (Le--938210-47). Sumatra: *Jacobson* 90 (Bz--20960). CULTIVATED: California: *W. Lee LASCA*.923 (Sd--80066). Hawaiian Islands: *Eastwood* s.n. [Honolulu, August 1--16, 1924] (Gg--34506); *Inafuku* s.n. [Feb. 2, 1931] (Ba, Bi, Mu, N--photo, Z--photo); *Isenberg* 12775 (Bi). India: *Scott* s.n. (Pd). Java: *Bakhuizen van den Brink* 1555 (Ut--24899A, Ut--24900A), 2642 (Bz--20971), 2694 (Bz--20969); *Herb. Hort. Bot. Bogor* s.n. (Bz--20964, Z); *Herb. Mus. Bot. Upsal*. s.n. [Buitenzorg Hort. Bot., 1932] (B, N); *Hofstee* 59 (Bz--20968); *Leeuwen-Reijnvaan* s.n. [10/8/09] (Bz--20973); *Popta* 60 (Bz--20967); *Soepadmo* 1 [Herb. Hort. Bot. Bogor. X.G.62] (N). Panama: *Moldenke & Moldenke* 19799 (N). Philippine Islands: *MacDaniels* 31 (Ba, Ws); *Pancho* 1093 (Ba); *Steiner* 504 (W--2376501). Sarawak: *Clemens & Clemens* 20479 [field no. 6571] (Bz--20966, N). Singapore: *Clemens & Clemens* 22567 (N); *Furtado* s.n. [Nov. 15, 1927] (Ca--343117). Sri Lanka: *Moldenke, Moldenke, Jayasuriya, & Dassanayake* 28339 (Pd). Zaire: *Corbisier* 110 (Br); *Vanderyst* 24690 (Br); *Vermoesen* 2156 (Br, Br, N, N. Qu).

CONGEA VESTITA W. Griff., Notul. Pl. Asiat., imp. 1, 4: 174--175. 1854 [not *C. vestita* "Griff. sec. Dop", 1966]

Synonymy: *Congea tomentosa* "Roxb. sec. Wight" apud Munir, Gard. Bull. Singapore 21: 302, in syn. 1966 [not *C. tomentosa* Hall. f., 1947, nor King & Gamble, 1959, nor Roxb., 1819, nor "Roxb. sec. Dop", 1966, nor "Roxb. sec. Fletcher", 1966, nor "Roxb. sensu King & Gamble", 1966]. *Congea vestita* var. *vestita* [W. Griff.] ex Munir, Gard. Bull. Singapore 21: 302. 1966.

Bibliography: W. Griff., Icon. Pl. Asiat. 4: pl. 458, fig. 21. 1854; W. Griff., Notul. Pl. Asiat., imp. 1, 4: 174--175, 513, & 749, pl. 458, fig. 21. 1854; C. B. Clarke in Hook. f., Fl. Brit. India 4: 603. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893; Gamble, Man. Ind. Timb., ed. 2, imp. 1, 545. 1902; Brandis, Indian Trees, imp. 1, 513. 1906; King & Gamble, Journ. Asiat. Soc. Bengal 74 (2 extra): 865--866. 1908; H. J. Lam, Verbenac. Malay. Arch. 337, 338, & 365. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 101 & x. 1921; Gamble, Man. Indian Timb., ed. 2, imp. 2, 545. 1922; Ridl., Fl. Malay Penins. 2: 640. 1923; Dop in Lecomte, Fl. Gén. Indo-chine 4: 908 & 911. 1936; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55 & 92. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 129 & 173. 1949; Mold., Resume 165, 177, 179, 217, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595. 1960; Mold., Resume Suppl. 3: 19. 1962; Munir, Gard. Bull. Singapore 21: 263, 265, 267, 271, 274--276, 279, 302--304, 313, & 314, map 4, fig. 9 (1966) and 22: 157. 1967; Mold., Resume Suppl. 15: 9 & 20. 1967; Mold. in Menninger, Flow. Vines 328. 1970; Brandis, Indian Trees, imp. 2, 513. 1971; W. Griff., Notul. Pl. Asiat., imp. 2, 4: 174--175 & 513. 1971; Mold., Fifth Summ. 1: 283, 295, 300, 305, 361, 468, & 469 (1971) and 2: 843. 1971; Gamble, Man. Indian Timb., ed. 2, imp. 3, 545. 1972; Mold., Phytologia 23: 423. 1972.

Illustrations: W. Griff., Icon. Pl. Asiat. 4: pl. 458, fig. 21. 1854; Munir, Gard. Bull. Singapore 21: 303, fig. 9. 1966.

Recent collectors refer to this plant as an extensive climber or liana, the bracts purple, the flowers scented, and the fruit winged, and have found it growing at 35--500 m. altitude, flowering from February to April and in November. The "flowers" [corollas?] are said to have been "pink" on *Sangkhachand* 757, "violet" on *Collector undetermined* 16, and "white" on *Kasin* 162. In Thailand *Sangkhachand* reports the species "common" in evergreen forests, while an unidentified collector found it "scattered in evergreen forests and some in deciduous forests".

The species is based on *Griffith* 898 from Mergui in the Burmese Mergui Archipelago and deposited in the Edinburgh herbarium. The *C. tomentosa* Hall. f., referred to in the synonymy above, belongs in the synonymy of *C. velutina* Wight, while the homonym credited to King & Gamble and to "Roxb. sensu King & Gamble" is *C. griffithiana* Munir and *C. tomentosa* Roxb. is a valid species. The *H. N. Moldenke* 9454, cited below, is a mixture of *C. vestita* and *C. tomentosa* Roxb.

Clarke (1885) cites for *C. vestita* only *Helfer* 6014 from Tenasserim and *Griffith* s.n. from the Mergui Archipelago. Munir (1966) cites the following collections: BURMA: *Beddome* 6530, *Helfer* 6014, *Lace* 4802 & 5591, *Meebold* 16999, *Pachman* 116, *Rogers* 406, *Wight* 2305. MERGUI ARCHIPELAGO: Mergui: *Griffith* 898, *Griffiths' Collector* s.n., *Meebold* 14078, *Proudlock* 44. CULTIVATED: Java: *Herb. Hort. Bot. Bogor.* XV.E.70 (in part). New York: *H. N. Moldenke* 9454 (in part).

Material of *C. vestita* has been misidentified and distributed in some herbaria as *C. peteloti* Mold., *C. tomentosa* Roxb., and *C. velutina* Wight. On the other hand the *Pierre* s.n. [Cochinchine], distributed as *C. vestita*, appears to be *C. pedicellata* Munir, while *Pierre* s.n. [Bavia] & s.n. [ad flum. Dong Nai], *Poilane* 11695, and *Thorel* 648 are *C. tomentosa* var. *nivea* Munir.

Citations: BURMA: *Helfer* 6014 (Mu--10540). MERGUI ARCHIPELAGO: Mergui: *Meebold* 14078 (N, N--photo, S, Si--photo, Z--photo). THAILAND: *Collector undetermined* 16 [Herb. Roy. Forest Dept. 18043] (Bk); *Kasin* 162 (Bz--72806); *Sangkhachand* 757 [Herb. Roy. Forest Dept. 23748] (Z). VIETNAM: Cochinchina: *Pierre* s.n. [2.1877] (S). MALAYA: Kedah: *Spare* 37314 (Bz--72781); *Wolfe* & *Kadir* 21455 (Bz--72780). CULTIVATED: Java: *Herb. Hort. Bot. Bogor.* XV.E.70 in part (Bz--26276, Bz, N). New York: *Connolly* s.n. [N. Y. Bot. Gard. Cult. Pl. 5496] (N, N); *H. N. Moldenke* 9454 (N, Qu), 9454a (N), 10408 (Go, N, Se--171585, Ur).

CONGEA VESTITA var. *SUBVESTITA* Munir, Gard. Bull. Singapore 21: 304--305. 1966.

Bibliography: Munir, Gard. Bull. Singapore 21: 267, 271, 275, 276, 279, 304--305, & 313, map. 4. 1966; Munir, Biol. Abstr. 48: 5018. 1967; Mold., Resume Suppl. 15: 10. 1967; Mold., Fifth Summ. 1: 300 (1971) and 2: 843. 1971; Mold., Phytologia 45: 61 & 275. 1980.

This variety differs from the typical form of the species in hav-

ing its branchlets, rachis, and the lower surface of its leaf-blades faintly yellowish-pubescent, rather than hirsute.

The variety is based on *Kloss s.n.* from Daban, at 650 meters altitude, Phan Rang, Vietnam, deposited in the herbarium of the British Museum in London. Munir (1966) cites only the type specimen and suggests that the taxon may represent a natural hybrid with *C. pedicellata* Munir or *C. tomentosa* var. *nivea* Munir.

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MATERIALS TOWARD A MONOGRAPH OF THE GENUS *LAMPAYA*

Harold N. Moldenke

There is the 48th genus to be treated in my series of notes in the present journal. Although time has not been available to make a formal monograph, it has been thought advisable to place on record here the notes on this genus assembled by my wife and myself over the past fifty years of intensive library and herbarium research so that they will be available to future monographers. Full explanation of the herbarium acronyms hereinafter employed (as they have been in all of my long series of papers in this journal since 1933) will be found in my "Fifth Summary of the *Verbenaceae*" (1971), volume 2, pages 795 to 801.

LAMPAYA R. A. Phil., Ann. Mus. Nac. Chile Bot. 1: 58. 1891.

Synonymy: *Lampaya* F. Phil., Verh. Deutsch. Wiss. Ver. Santiago 1: 160, in obs. 1886; Mold., Suppl. List Inv. Names 21. 1941.

Lampayo Phil. ex Murillo, Pl. Médic. Chil. 163, nom. nud. 1889; Mold., Suppl. List Inv. Names 4, in syn. 1941.

Bibliography: F. Phil., Verh. Deutsch. Wiss. Ver. Santiago 1: 160. 1886; Murillo, Pl. Méd. Chil. 163. 1889; R. A. Phil., Ann. Mus. Nac. Chile Bot. 1: [Cat. Praev. Pl. Itin. Tarap.] 58, pl. 2, fig. 5. 1891; R. A. Phil., Verz. Hoheeb. Prov. Antofag. Tarap. Pfl. pl. 2. 1891; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, Nachtr. zu 4 (3a): 290. 1897; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 237. 1903; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 430. 1904; Fries, Nov. Act. Reg. Soc. Sci. Upsal. 4 (1): [Nord Argent.] 110. 1905; Reiche, Verhandl. Deutsch. Wiss. Ver. Santiago 5: 6. 1905; Reiche & Phil. in Reiche, Estud. Crit. Fl. Chile 5: 272 & 303--304. 1910; M. Kunz, Anatom. Untersuch. Verb. 35 & 36. 1911; Nienburg, Justs Bot. Jahresber. 39 (2): 1051. 1916; Fedde, Justs Bot. Jahresber. 39 (2): 1420. 1917; Dominguez, Invest. Fito-quim. 196. 1928; Baeza, Nomb. Vulg. Pl. Silv., ed. 2, 122. 1930; Stapf, Ind. Lond. 4: 37. 1930; Junell, Symb. Bot. Upsal. 1 (4): 36--37. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 154. 1938; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 237. 1941; Mold., Phytologia 2: 51--52. 1941; Mold., Suppl. List Inv. Names 4. 1941; Mold., Alph. List Inv. Names 27. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 42, 43, & 94. 1942; Mold., Alph. List Cit. 1: 95 (1946) and 2: 537. 1948; H. N. & A. L. Mold., Pl. Life 2: 31, 43, 53, & 64. 1948; Mold., Alph. List Cit. 3: 690 & 813 (1949) and 4: 1293. 1949;

Mold., Known Geogr. Distrib. Verbenac., ed. 2, 96, 101, 104, & 187. 1949; Metcalfe & Chalk, Anat. Dicot. 1031, 1032, & 1040. 1950; Hunziker, Rev. Invest. Agr. 6: 192. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 131. 1953; Angely, Cat. Estat. Gen. Bot. Fan. 17: 4. 1956; Cabrera, Revist. Invest. Agric. 11: 336. 1957; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 430. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 237. 1959; Mold., Résumé 113, 121, 124, 302, 407, & 458. 1959; Muñoz Pizarro, Espec. Pl. Descr. Philip. 110. 1960; Dalla Torre & Harms, Gen. Siphonog., imp. 3, 430. 1963; F. A. Barkley, List Ord. Fam. Anthoph. 75 & 178. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 615. 1966; Rouleau, Guide Ind. Kew. 104 & 352. 1970; Heusser, Pollen Spores Chile 61 & 82, pl. 57-665. 1971; Mold., Fifth Summ. 1: 182, 192, & 197 (1971) and 2: 534, 756, & 883. 1971; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 12 (1): 131. 1972; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 632. 1973; Mold., Phytologia 28: 458 & 509. 1974; Montes, Wilkomirsky, & Ubilla, Pl. Med. 25: 192. 1974; Napp-Zinn, Anat. Blatt. A (1): 418. 1974; Troncoso, Darwiniana 18: 296, 301, 302, 306, 355--358, & 409, fig. 16 & 17. 1974; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 13: 130 & 328. 1976; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40 & 47. 1978.

Philippi's original (1881) description of this genus is: "Calyx hypogynus, tubulosus, quinque-dentatus, dentibus brevibus parum inaequalibus. Corolla tubulosa versus os sensim infundibuliformi-dilatata, lobis limbi brevibus, obtusis, subaequalibus, demum reflexis. Stamina didynamia; antherae globosae, inferiores in faucibus corollae sessilibus, superioribus filamento brevi stipitatae, laciniis corollae subbreviores. Ovarium ovatum, biloculare, loculis uniovulatis; stylus filiformis, corollam aequans, apice truncatus; stigma apex styli. Fructus calyce inclusus, ovatus, subcostatus, epicarpio forte carnosulo, in pyrenas duas, ad commissuram concavas facile secedens, quae semen unicum includunt."

Troncoso (1974) has amplified this description to: "Cáliz breve, tubuloso, persistente y acrescente en el fruto, 5-dentado, dientes cortos, agudos, desiguales, generalmente incurvos. Corola zigomorpha de tubo largo, recto, estrecho, ligeramente dilatado en la parte superior; limbo reducido, 5-lobado, lóbulos subiguales, obtusos enteros y recurvos. Estambres 4 didinamos, insertos en la porción superior del tubo corolar cerca de la garganta, incluidos; filamentos muy breves; anteras globosas, tecas paralelas dorsifijas. Ovario unicarpelar y 2-locular. lóculos uniovulados; óvulos anátropos, ascendentes, basales; estilo filiforme, de igual longitud o superando el tubo corolar; estigma bilobada con el lóbulo anterior grueso, papiloso y el posterior reducido y agudo. Esquizocarpio drupáceo subcarnoso, con 2 núculas óseas uniseminadas, algo coherentes a la madurez. Semillas oblongas, exalbuminadas. Arbustos en general bajos, achaparrados, muy ramosos, de tallos postrados, formando matorrales; ramas cortas erectas o extendidas, densamente viscosas, de corteza gruesa, rugosa, rojiza; entrenudos breves. Hojas opuestas coriáceas o subcarnosas, uninervadas, por lo general imbricadas, ovales o elípticas, enteras, uniformemente verde-grisáceas, glabras, brevísimamente pecioladas. Espigas

terminales contraídas paucifloras. Flores azul-violáceas, bracteadas; bracteas escamiformes."

The type species of the genus is *L. medicinalis* R. A. Phil.

As to the geographic distribution of the genus, Troncoso (1974) says: "Bolivia, N. de Chile y NO. de la Argentina. Habita las regiones desérticas del altiplano boliviano-argentino-chileno, constituyendo un elemento característico de la provincia puneña... Se extiende hacia el S hasta la provincia de La Rioja."

Although six binomials have been published in the genus, as of now it appears that the genus comprises only three valid species. Dalla Torre & Harms (1904) recognized only a single species; Angely (1956) recognizes three. For gynoecium morphology and economic uses, see under *L. medicinalis* R. A. Phil.

A reference, "Engl. & Prantl, Nat. Pflanzenfam. Nachtr. 2: 66", appears in the literature, but has not as yet been located or verified by me.

LAMPAYA CASTELLANI Mold., Phytologia 2: 51--52. 1941.

Bibliography: Mold., Phytologia 2: 51--52. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 43 & 94. 1942; Mold., Alph. List Cit. 1: 95 (1946) and 2: 441 & 536. 1948; H. N. & A. L. Mold., Pl. Life 2: 53. 1948; Mold., Alph. List Cit. 4: 1293. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 96, 104, & 187. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 131. 1953; Cabrera, Revist. Invest. Agric. 11: 354, 359, & 369, fig. 7 B & pl. 10 (1) (1957) and 11: 398. 1958; Mold., Résumé 113 & 458. 1959; Heusser, Pollen Spores Chile 61 & 62, pl. 57-665. 1971; Mold., Fifth Summ. 1: 182 & 197 (1971) and 2: 883. 1971; Troncoso, Darwiniana 18: 355 & 356. 1974.

Illustrations: Cabrera, Revist. Invest. Agric. 11: 354, fig. 7 B & pl. 10 (1); Heusser, Pollen Spores Chile 62, pl. 57-665. 1971.

This species is based on *Herb. Mus. Argent. Cienc. Nat.* 20161, collected by Alberto Castellanos between Cienaga Grande and Cerillos, Jujuy, Argentina, on February 5, 1937, and is deposited in the Britton Herbarium at the New York Botanical Garden. A splendid photograph of the plant in situ is provided by Cabrera (1957) on his plate 10. He states that the plant is medicinal and that its vernacular name is "lampaya". He cites Cabrera 8763 & 9303, Fries 969, and Fernández 15. Troncoso (1974) lists it only from Jujuy and comments that further field work is required before a final decision can be made as to its specific validity.

Recent collectors refer to the plant as a shrub, 20--50 cm. tall, and have found it growing in sandy soils at 3500--3800 m. altitude, flowering in December, February, and March. The corollas are said to have been "lilac" on Cárdenas 3710 and "tube white, limb violet" on Fries 969. The pollen is described by Heusser (1971) as "Monad, isopolar, radiosymmetric; tricolporate, colpi long and narrow, pores transverse, usually constricted at the crossing of each colpus; spheroidal, amb triangular with sides concave; exine as much as 2 μ thick, faintly tectate, fossulate; 31--36 x 31--36 μ .", based on Cárdenas s.n. [U. S. Nat. Herb. 1909477] from Bolivia.

[to be continued]

STUDIES IN RHAMNACEAE I. *Condalia henriquezii* Boldingh in
Venezuela.

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Missouri Botanical Garden

During routine curatorial work in the Herbarium of the Missouri Botanical Gardens a phytogeographically interesting representative of a genus new to Venezuela was discovered in a consignment of specimens sent for identification for the Flora of the Falcón Project.

Condalia henriquezii Boldingh is reported here as a new specific and generic record for Venezuela

According to JHONSTON (1962 and 1972) *Condalia* Cavanilles is an exclusively American genus of arid zones habitats with twelve species in North America (Texas, Baja California, and North Mexico), five species in continental South America (Argentina, Southern Peru, and Southeast Brasil), and one species *Condalia henriquezii*, known only from the Dutch West Indies (Curacao and Bonaire).

When Boldingh originally described *C. henriquezii* from Curacao and Bonaire in 1914, it represented a remarkable disjunction in the generic range, well over 1000 miles from the nearest station for *Condalia* in either North or South America. The new record from northern Venezuela is only 20 miles away from the type locality in Bonaire and Curacao.

Discovery of *C. henriquezii* in Venezuela suggests that the species should be reinterpreted as a native of the thorn-scrub forest of coastal Venezuela which also reaches the dry offshore islands, a pattern it would share with many other species. The Dutch Islands are both geologically young and biotically depauperate, and existence of this remarkably disjunct representative of *Condalia* as an endemic there presented a phytogeographic enigma. That *Condalia* has not been collected

previously in Venezuela is hardly surprising in view of its inconspicuous flowers and the general lack of collections in this region.

Condalia henriquezii Boldingh seems to be closely related to Condalia weberbaueri Perkins from Perú and Condalia buxifolia Reissek from Brasil. Its discovery in coastal Venezuela provide appropriate representation for the genus in all of the main areas of dry habitat in the Neotropics which might suggest a more continuous distribution of Condalia through intervening regions during periods of drier climate.

In a forthcoming paper (1980) I will present a key to the Venezuelan genera of Rhamnaceae, including Condalia. Collection data are as follows:

VENEZUELA: Falcón State, Coro, médanos 1 km. norte de la Catedral. Alt. 10 m./s.n.m. En médanos con Prosopis. Arbus to 1.5-2.5 m. de alto. Flores verdes, tornandose amarillos cuando mueren y caen. Caliz 5-m. Corola ausente. Estambres 5, alternandose con los sépalos. Gineceo 2-locular, lóculos 1-blastos, ovúlos basales, anátropos. 19 de Abril 1978. R. Wingfield 5322 fl. (MO.); 28 de Julio 1978 R. Wingfield 5322a fr. (MO.).

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STUDIES IN RHAMNACEAE II. *Ampelozizyphus amazonicus* Ducke
in Venezuela.

Henry A. Rodríguez-Carrasquero *
Missouri Botanical Gardens

A new range extension for *Ampelozizyphus amazonicus* Ducke, a poorly collected monotypic woody vine, is herein reported for Venezuela.

It was originally described by DUCKE (1935) from Amazonian Brasil and later recorded by MACBRIDE (1956) from the Peruvian Amazonia from only five collections.

Ampelozizyphus has recently been collected once from the Guayana of Venezuela and also from the Ecuador-Perú border, (Pastaza Department-Loreto Department). This represents another example of some artificial disjunction patterns of poorly collected neotropical areas.

Ampelozizyphus amazonicus Ducke has been mainly collected along rivers and on "terra firme" and should be sought in comparable areas in Ecuador and Colombia Amazonia.

Its inflorescence and leaves suggest certain Menispermaceae, and according to DUCKE (1935), the outer bark has the odor of methyl salicylate, as does *Pourouma*, some *Polygalas*, and *Parkia oppositifolia* Spruce ex-Bentham. In a forthcoming paper (1980) I will present a key to the Venezuelan genera.

Collections data for the new collections are as follows:

VENEZUELA: Amazonas Federal Territory, 11 kms. northeast of San Carlos de Río Negro, 1° 58' N, 67° 03' W alt. 120 m. Primary Forest adjacent to road near mammal site at Huachica. Laterite soil except white sand near stream. Common name: hoja de mano. 15 Nov. 1977 lvs. and fr. Ronald Liesner 3508 (MO)

*This paper was supported by the Facultad de Ciencias Forestales, Universidad de Los Andes, Mérida, VENEZUELA.

PERÚ: Loreto Department, Río Corrientes at the Ecuador border, between Teniente Lopez and Puerto Avanzado, 280-350 m. alt. Vine, flowers tannish. 4 April 1977 lvs. and fls. Al Gentry, Juan Revilla, and Doug Daly 19032 (MO).

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STUDIES IN NEOTROPICAL SAPOTACEAE III.

Ecclinusa guianensis Eyma in Panamá.

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Ecclinusa Martius, a poorly known and rarely collected genus of about ten species centered in Guayana region and previously known only from northern Brasil, Venezuela, the Guianas, Amazonian Perú, and one species in Colombia (Chocó), has been recently collected in Panamá, AUBREVILLE (1961, 1972) and RODRIGUEZ-CARRASQUERO (1980).

The panamanian collection is Ecclinusa guianensis Eyma, previously known from the Guayana area (Venezuela, northern Brasil, Surinam, Cayenne, and Guyana). It was collected in 1977 in Bocas del Toro Province by B.L. Gordon during his ongoing primates studies.

This apparently represents a remarkable range disjunction. While this long disjunction between Guayana and eastern Panamá might be a collection artifact, GENTRY (1979) lists nineteen other genera which have similar patterns of disjunction.

As another example of the Guayana-Panamá disjunction, the new report of Ecclinusa guianensis from Panamá, further supports the Gentry's hypothesis that this is a real biogeographic pattern.

* This work was supported by the Universidad de Los Andes, Facultad de Ciencias Forestales and Consejo de Desarrollo Científico y Humanístico, Mérida, VENEZUELA.

Collection data are as follows: PANAMÁ, Bocas del Toro Province, Río San Pedro, Guayme country; common name: negrito; fruits are partially eaten by animals. $9^{\circ} 60' N, 81^{\circ} 30' W$
July 9, 1979 B.L. Gordon 59-C.

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EVALUATION OF H. LÉVEILLÉ'S NEW HAWAIIAN SPECIES
Hawaiian Plant Studies 76

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Abbe Urbain Faurie was a French Catholic missionary to Japan. When so urged he made a plant collection, and sent it to Abbe (Augustin Abel) Hector Léveillé of Le Mans, France. Léveillé described a large percentage of them as new species, and named most of them *Fauriei*. Inspired by this distinction, Faurie made more and more collections, and finally resigned from the mission to become a plant collector. From April 1909 to June 1910 he explored the Hawaiian Islands, and collected some 1,160 numbers of plants.

On studying this Hawaiian collection (1911-1913) Léveillé published 114 of them as new species (or varieties). His diagnoses were about four or five lines in length, and seldom gave any measurements, or contained a comparison with the closest known species. His work was hasty and careless, and of his Hawaiian new species about half are synonyms of valid, earlier published species. J. F. Rock (1914) published a critical review of Léveillé's Hawaiian "novelties."

The writer is in general agreement with Rock's treatment, but subsequent monographs, and observations by the writer, have caused numerous changes. Consequently it is desirable to publish a new critique of the Hawaiian species published by Léveillé.

Of the 114 new Hawaiian taxa published by Léveillé 61 are synonyms, 5 have become basionyms, 2 are species dubia, and 46 are now accepted as good species or varieties.

Léveillé's Species arranged by Families according to Léveillé. The numbers are the collection numbers

Piperaceae

Peperomia Fauriei 108, Molokai

P. Helleri 109, Molokai

P. refractifolia 123, Molokai = *P. Cookiana* C. DC.

Urticaceae

Pipturus hawaiiensis 508, Hawaii

Pittosporaceae

Pittosporum Fauriei 18, 38, Oahu = *P. glabrum* H. & A.

P. Hillebrandii 17, Molokai = *P. insigne* Hbd., var.

Hillebrandii (Lévl.) Sherff

Rosaceae

Rubus Damieni 805, Molokai = *R. hawaiiensis* Gray

Rubus Hillebrandii 802, 806, Hawaii, Maui = *R. hawaiiensis* Gray

R. Koehnei 801, Maui, published in 1911, hence the earlier, valid binomial, and *R. penetrans* Bailey, 1933, becomes a synonym.

Rutaceae

Pelea acutivalvata 172, Kauai = *P. peduncularis* Lévl.

P. Fauriei 104, 203, Molokai = *P. clusiaefolia* Gray, var. *Fauriei* (Lévl.) St. John & Hume

P. Feddei 194, Kauai

P. foetida 193, Maui = *P. molokaiensis* Hbd.

P. grandipetala 4, Oahu = in part *P. honoluluensis* St. John in part *P. peduncularis* Lévl.

P. Hillebrandii 183, 184, Kauai = *P. anisata* Mann

P. Leveillei 1, Kauai

P. nodosa 5, Kauai = *P. anisata* ?

P. oahuensis 11, 217, 217bis, Oahu

P. peduncularis 189, Oahu

P. penduliflora 9, Sandwich Is. = *P. peduncularis* Lévl.

P. singuliflora 194, 195, 224 = in part *P. peduncularis* Lévl.; in part *P. Wawraeana* Rock

P. subpeltata 209, Kauai = *P. anisata* Mann

P. waianaiensis 215, Oahu = *P. peduncularis* Lévl., var. *quadrata* Stone

Euphorbiaceae

Euphorbia Hillebrandii 468, Oahu

Phyllanthus sandwicensis F. Muell., var. *hypoglaucous* = *Breynia disticha* Forst f., f. *nivosa* (W. G. Sm.) Croizat

Aquifoliaceae

Byronia Helleri 280, Kauai = *Ilex anomala* H. & A.

Malvaceae

Hibiscus Fauriei 828, Oahu = *H. schizopetalus* (Mast.)

Hook. f., fide Rock; or = *H. Arnottianus* Gray, fide Roe. These two species are strikingly different.

Neither of the botanists could have been mistaken, so there was doubtless a mixed number, with duplicate sheets, each with a different species.

Malva hawaiiensis 855, 858 = *M. moschata* L.

Sida Fauriei 5, Oahu = *Malvastrum coromandelianum* (L.) Garcke

S. oahuensis 839, Oahu = *Malvastrum coromandelianum* (L.) Garcke

S. sandwicensis 6, Sandwich Is. = *S. fallax* Walp.

Sterculiaceae

Waltheria Fauriei 841, Oahu - *Triumfetta Bartramia* L.

Violaceae

Isodendron (as *Isodendron*) *Fauriei* 693, Molokai = *Gouania Hillebrandii* Oliver in Hbd.

Viola sandwicensis 1, Oahu - *Cyrtandra sandwicensis* (Lévl.) St. John & Storey

Thymeliaceae

- Wikstroemia Fauriei* 548, Maui = *W. sandwicensis* Meisn.
in A. DC.

Myrtaceae

- X *Nania Fauriei* 27, Molokai. = *Metrosideros polymorpha*
Gaud., ssp. *incana* (Lévl.) Skottsb., var. *Fauriei*
(Lévl.) Skottsb.
- X *N. Feddei* 32, Kauai = *Metrosideros tremuloides* (Heller)
Rock, fide Rock, but that species in known only on Oahu.
- N. macropus* (H. & A.) Ktze., f. *microphylla* 26, Kauai.
This has not been seen or placed.
- N. polymorpha* (Gaud. Heller, var. *incana* 28, Molokai
= *Metrosideros polymorpha* Gaud., subsp. *incana*
(Lévl.) Skottsb.
- N. polymorpha* (Gaud.) Heller, var. *glaberrima* 35, Oahu.
= *Metrosideros polymorpha* Gaud. subsp. *glaberrima*
(Lévl.) Skottsb.
- N. polymorpha* (Gaud.) Heller, var. *nummulariaefolia* 34,
Hawaii. = *Metrosideros polymorpha* Gaud., var.
polymorpha.
- N. polymorpha* (Gaud.) Heller, var. *sessilis* 32. Oahu.
This has not been seen or reassigned.

Araliaceae

- Cheirodendron trigynum* (Gaud.) Heller, var. *Hawaiensis*
262, = var. *trigynum*.
var. *Kauaiensis* 266 = *C. Fauriei* Hochr., Kauai.
var. *mauiensis* 265, Maui.

Ericaceae

- Vaccinium Fauriei* 700, 702, Molokai = *V. calycinum* Sm.,
var. *calycinum*, f. *Fauriei* (Lévl.) Skottsb.
- V. hamatidens* 699, Kauai = *V. calycinum* Sm., var.
calycinum, f. *hamatidens* (Lévl.) Fosb.

Epacridaceae

- Cyathodes imbricata* Stschegl., var. *volcanica* 442, 445,
Hawaii = *Styphelia Douglasii* (Gray) F. Muell. ex Skottsb.

Myrsinaceae

- Myrsine Fauriei* 422, 423, 427, Oahu = *M. Lessertiana* A. DC.
- M. molokaiensis* 435, Molokai = *Planchonella spathulata*
(Hbd.) Pierre, var. *molokaiensis* (Lévl.) St. John.
var. *punctata* 447, Kauai = *M. punctata* (Lévl.)
Wilbur.
- M. sandwicensis* A. DC., var. *mauiensis* 449, Maui.
- M. Vanioti* 448, Oahu = *M. sandwicensis* A. DC.
- Suttonia apodocarpa* 446, Kauai = *Myrsine punctata*
(Lévl.) Wilbur.
- S. cuneata* 2, 3, 431, Hawaii = *Myrsine Lessertiana* A. DC.
- S. flavida* 4, 5, Maui = *Myrsine Lessertiana* A. DC.
- S. mauiensis* 449, Maui = *Myrsine sandwicensis* A. DC.,
var. *mauiensis* Lévl.
- S. Meziana* 428, = *Myrsine Meziana* (Lévl.) Wilbur.

- Suttonia pukooensis* 426, Molokai = *Myrsine pukooensis* (Lévl.) Hosaka.
S. punctata 447, Kauai = *Myrsine punctata* (Lévl.) Wilbur
S. Vanioti 448, Oahu = *Myrsine sandwicensis* A. DC.
Primulaceae
Lysimachia daphnoides Hbd., var. *Fauriei* 708, Oahu
= *L. Hillebrandii* Hook. f. ex Gray.
Apocynaceae
Alyxia (as *Alixia*) *myrtillaefolia* (Gray) Lévl., 455,
Molokai = *A. olivaeformis* Gaud., f. *myrtillaefolia*
(Gray ex Hbd.) St. John.
Convolvulaceae
Ipomoea Fauriei 1,035, 1,049 = *I. stolonifera* (Cyrill.)
J. F. Gmel.
I. koloaensis 1,036, Kauai = *I. stolonifera* (Cyrill.)
J. F. Gmel. Rock called this *I. pes-caprae* Sw., so
the several sheets under this number may have contained
a mixture.
Labiateae
Stenogyne Fauriei 911 = *Coleus Blumei* Benth.
Solanaceae
Solanum Fauriei 861 = *S. nigrum* L.
Scrophulariaceae
Herpestis Fauriei 1,126, Hawaii = *Bacopa Monnieria*
(L.) Wettst.
Veronica hawaiiensis 892, Hawaii = *V. arvensis* L.
Gesneriaceae
Cyrtandra asaroides in part, 623, Kauai = *C. oenobarba*
Mann, var. *oenobarba*.
in part, 624, Kauai = *C. oenobarba* Mann, var.
petiolaris (Wawra) Clarke
C. Fauriei 632, Molokai = *C. lysiosepala* (Gray) Clarke,
var. *Fauriei* (Lévl.) Rock
C. Kamoloensis 646, Molokai = *C. Grayana* Hbd.
C. oahuensis 638, Oahu
C. Vanioti 1,144, Oahu
C. Wainihaensis 640, Oahu (probably = Kauai), not seen.
Myoporaceae
Myoporum Fauriei 677, Molokai = *M. sandwicense* Gray,
subsp. *Fauriei* (Lévl.) Kraenzlin
Plantaginaceae
Plantago Fauriei 1,078, Kauai = *P. princeps* C. & S.,
var. *longibracteata* Mann
P. Gaudichaudiana 1,075, Hawaii = *P. hawaiiensis* (Gray)
Pilger, var. *hawaiiensis*
Rubiaceae
Coprosma Fauriei 330, Kauai = *C. stephanocarpa* Hbd.
C. parvifolia = *C. stephanocarpa* Hbd. The data 324 and
Molokai supplied by Rock (1914: 358).
Gouldia cirrhopetiolata 344, 416, Maui, Molokai.
Of two different hybrids, fide Fosberg.

Kadua herbacea 368, Maui = *Hedyotis Cookiana* (C. & S.) Steud., var. *herbacea* (L  vl.) Fosb.

Straussia Fauriei 400, Oahu = *Psychotria Fauriei* (L  vl.) Fosb.

Cucurbitaceae

Sicyos Fauriei 877, Oahu = *Momordica charantia* L.

Lobeliaceae

Clermontia carinifera 10, Kauai = a species dubia, fide Rock.

C. Fauriei 578, Kauai = *C. clermontioides* (Gaud.) Heller

C. fulva 11, Kauai

Cyanea Blinii 575, Hawaii = *Clermontia parviflora* Gaud.

C. Fauriei 565, 591, Kauai = *C. coriacea* (Gray) Hbd., var. *Fauriei* (L  vl.) E. Wimm.

C. Feddei 567, Kauai = *C. fissa* (Mann) Hbd.

C. multispicata 576, 594, Kauai

C. salicina 569, Kauai. Described from a specimen with only leaves. Species dubia.

Delissea Fauriei 572, Molokai. Not seen by Rock, Wimmer, or the writer. The genus is otherwise unknown on Molokai.

Rollandia Fauriei 568, Kauai = *Cyanea spathulata* (Hbd.) Heller

Goodeniaceae

X Scaevola Blinii 661, Kauai = *S. procera* Hbd.

S. Chamissonis Gaud, var. *caerulescens* 659, Kauai

S. Fauriei 651, Kauai = *S. Taccada* (Gaertn.) Roxb., var. *Fauriei* (L  vl.) St. John

Compositae

Ageratum sandwicensis 940, Maui, not seen, but probably = *A. conyzoides* L.

Campylothea rutifolia = *Bidens Hillebrandiana* (Drake) Deg. ex Sherff

Cnicus hawaiiensis 963, Hawaii = *Cirsium arvense* L. ? fide Rock

Crepis molokaiensis 974, 976, Molokai = *Hypochoeris radicata* L.

Dubautia Fauriei 920, Maui = *D. laxa* H. & A., var. *hirsuta* Hbd.

Lipochaeta asymetrica 960, Oahu = *Bidens asymmetrica* (L  vl.) Sherff

L. Fauriei 1,012, Kauai

L. variolosa 1,008, 1,009, Molokai, Kauai = *L. succulenta* (H. & A.) DC., Gardner chose 1,008 as lectotype.

Raillardia Fauriei 1,015, Hawaii = *R. ciliolata* DC., var. *laxiflora* (DC.) Sherff

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Repert. 10: 373; LXXX-LXXXVI: 442-444; LXXXVII-
LXXXVIII: 476.
1912. *Decades plantarum novarum* LXXXIX, Fedde Repert.
32; XC-XCII: 63.
1913. *Decades plantarum novarum* CXXVI, Fedde Repert.
12: 505-506.

A NEW VARIETY OF NOTOTRICHIIUM VIRIDE (ANARANTHACEAE)

HAWAIIAN PLANT STUDIES 98

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Nototrichium viride Hbd. consists of a species and two varieties, known from Kauai and Oahu. Now there is to be added to them a third variety from the island of Molokai.

Nototrichium viride Hbd., var. kalaupapae var. nov.

Diagnosis Holotypi: Ramulis petiolis et pedunculis viridibus et adpresse albo-puberulis, petiolis 15-30 mm longis, laminis 3-11.5 cm longis 2-7.8 cm latis molliter chartaceis supra clare viridibus et in juvente adpresse albo-pilosulis mox subglabratibus infra albo-pilosulis late ovatis apice subacuminato basi cordata, pedunculis 16-50 mm longis, spicis 6-15 mm longis 6 mm diametro subglobosis vel ovoideis, floribus 3 mm longis, sepalis proxima apicem partim glabris alibi pilosis cum pilis 1.5-0.5 mm longis.

Diagnosis of Holotype: Branchlets, petioles, and peduncle green, closely appressed white puberulous; petioles 15-30 mm long; blades 3-11.5 cm long, 2-7.8 cm wide, soft chartaceous, above bright green, at first sparsely appressed white pilosulous, but quickly subglabrate, below permanently white pilosulous, broadly ovate, the apex subacuminate, the base cordate; peduncles 16-50 mm long; spike 6-15 mm long, 6 mm in diameter, subglobose ovoid; flowers 3 mm long, the sepals partly glabrous near the tip, but elsewhere pilose with hairs 1.5-0.5 mm long.

Holotypus: Hawaiian Islands, Molokai Island, Kalaupapa, Uau Crater (=Puu Uao), inside crater, March 8, 1974, Betsy Harrison & Wayne Gagne (BISH).

Discussion: The new variety from Molokai differs from var. subtruncatum Sherff which has its blades 5.5-8.5 cm long, and widely cuneate to subtruncate at base. The var. kalaupapae has its blades 3-11.5 cm long, and they are cordate at base.

REDUCTION IN TAXONOMIC RANK OF SOME VERBENACEAE AND ERIOCAULACEAE

Harold N. Moldenke

PAEPALANTHUS KARSTENII f. *COREI* (Mold.) Mold., stat. nov.

Paepalanthus karstenii var. *corei* Mold., Phytologia 29: 386. 1974.

LANTANA CAMARA f. *ALBA* (Mold.) Mold., stat. nov.

Lantana camara var. *alba* Mold., Phytologia 5: 132. 1955.

LANTANA CAMARA f. *FLAVA* (Medic.) Mold., stat. nov.

Lantana flava Medic., Act. Acad. Theod. Palat. Phys. 3: 225.
1775.

LANTANA CAMARA f. *MACRANTHA* (Loes.) Mold., stat. nov.

Lantana camara var. *macrantha* Loes., Verh. Bot. Ver. Brand. 53:
76. 1912.

LANTANA CAMARA f. *MISTA* (L.) Mold., stat. nov.

Lantana mista L., Syst. Nat., ed. 12, 417. 1767.

LANTANA CAMARA f. *MULTIFLORA* (Otto & Dietr.) Mold., stst. nov.

Lantana camara var. *multiflora* Otto & Dietr., Allg. Gartenzeit.
9: 370. 1841.

LANTANA CAMARA f. *MUTABILIS* (Hook.) Mold., stat. nov.

Lantana nivea var. *mutabilis* Hook., Curtis Bot. Bot. pl. 3110.
1831.

LANTANA CAMARA f. *NANA* (Mold.) Mold., stat. nov.

Lantana camara var. *nana* Mold., Phytologia 28: 402. 1974.

LANTANA CAMARA f. *ROSEA* (Mosty) Mold., stat. nov.

Lantana camara rosea Mosty ex Mattoon, Pl. Buyers Guide, ed. 6,
167. 1958.

LANTANA CAMARA f. *RUBELLA* (Mold.) Mold., stat. nov.

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LANTANA CAMARA f. *RUBRA* (Mosty) Mold., stat. nov.

Lantana camara rubra Mosty ex Mattoon, Pl. Buyers Guide, ed. 6,
167. 1958.

LANTANA CAMARA f. *SANGUINEA* (Medic.) Mold., stat. nov.

Lantana sanguinea Medic., Act. Acad. Theod. Palat. Phys. 3: 229.
1775.

LANTANA CAMARA f. *SPLENDENS* (Medic.) Mold., stat. nov.

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LANTANA CAMARA f. *TERNATA* (Mold.) Mold., stst. nov.

Lantana camara var. *ternata* Mold., Phytologia 8: 160. 1962.

LANTANA CAMARA f. *VARIA* (Kuntze) Mold., comb. nov.

Lantana aculeata α *subinermis* f. *varia* Kuntze, Rev. Gen. Pl.
2: 503. 1891.

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PHYTOLOGIA

A cooperative nonprofit journal designed to expedite botanical publication

Vol. 45:

April 1980

No. 4

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$2.75; for this volume \$11.00 in advance or \$12.00 after close of the volume; \$3.00 extra to all foreign addresses; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number; back volume prices apply if payment is received after a volume is closed.

NOTES ON MIKANIA (COMPOSITAE) - VI

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Continued studies in Mikania (Eupatorieae) have resulted in the following notes which propose two new species and clarify the status of another name. This will be the final note preparatory to completion of the treatment of Mikania for Perú.

MIKANIA DUDLEYI Holmes & McDaniel, sp. nov.

Suffrutex volubilis; foliis ovato-oblongis, ad 13 cm longis et 6 cm latis, apice attenuatis, basi anguste cordatis, subpinnatinervis; inflorescentiis paniculatis, ca 12 cm longis et 7 cm longis; capitulis 6 mm longis; corollis 3.5 mm longis, dentibus limbi late triangularibus, achaeniis ca 1.5 mm longis; pappi setis ca 30, ca 4.5 mm longis, barbellatis.

Subligneous liana, stems terete, costate-striate, glabrate, internodes to 18 cm long. Leaves ovate-oblong, coriaceous, dark green, glossy to 13 cm long and 6 cm wide, margins entire to remotely and obscurely denticulate, apices attenuate, bases narrowly cordate (bracteal leaves subcordate to truncate), upper surfaces glabrate to puberulent, glandular, subpinnately nerved from near the base with two pairs of secondary nerves separating within 1 cm of the base thence arching toward the apex, tertiary veins exserted, transverse, lower surfaces puberulent, glandular, veins exserted, petiole to 2.5 cm long, thickish. Inflorescence a panicle, to ca 12 cm long and 7 cm in diameter, branchlets terete, crisp-puberulent, pedicels ca 1 mm long, terete, puberulent. Heads ca 5-6 mm long, exterior bract linear-lanceolate, ca 1.5 mm long, puberulent, borne at the base of the pedicel. Involucral scales linear to elliptic-oblong, ca 4 mm long, puberulent, apices somewhat acute, densely puberulent-pilose. Corolla violet, ca 3.5 mm

long, glandular, tube ca 1.3 mm long, throat campanulate, ca 2.3 mm long, teeth broadly triangular, ca 0.6 mm long, glandular, puberulent. Achene (immature) ca 1.5 mm long, brownish. Pappus bristles ca 30, white, ca 4.5 mm long, barbellate, thickened at the tips.

TYPE: PERU. Cuzco. La Concepción, exposed steep ridges at top of old landslide below Camp 5, ca 2800 m, July 9, 1968, T. R. Dudley 10913 (US, holotype).

Mikania dudleyi is characterized by ovate leaves with narrowly cordate bases. Venation is subpinnate, with two pairs of secondary nerves separating within about one centimeter of the point of insertion of the petiole. Tertiary veins are prominent and transverse. Surfaces of the leaves are uniformly glandular, with the lower surfaces puberulent. The exterior bract is borne well beneath the involucre. The corolla is violet in color, glandular, and has corolla teeth that are broadly triangular and much shorter in length than the throat.

This species, which is known only from the type, does not appear to resemble any known Peruvian species of Mikania.

MIKANIA SHUSHUNENSIS Holmes & McDaniel, sp. nov.

Suffrutex volubilis; foliis lanceolatis vel ovatis, attenuatis, ad 10 cm longis et 4.5 cm latis, basi cuneatis, pinnatinervis; inflorescentiis paniculatis, ad 15 cm longis et 7 cm latis; capitulis 6 mm longis; corollis 4 mm longis, dentibus limbi lanceolatis; achaeniis ca 1.8 mm longis; pappi seti ca 30-35, ca 4.5 mm longis, scabridis.

Liana, stems terete, costate, glabrous, pithy, internodes to ca 7 cm long. Leaves lanceolate to ovate, to 10 cm long and 4.5 cm wide, apices attenuate, bases cuneate, margins entire, pinnately nerved, surfaces glabrous, lower prominently reticulate, petiole ca 1.5 mm long, glabrous. Inflorescence a panicle, to ca 15 cm long and 7 cm in diameter, branchlets puberulent. Heads somewhat racemosely disposed, ca 6 mm long, exterior bract linear, ca 3 mm long, puberulent, borne at the base of the pedicel. Involucral scales lanceolate, ca 5 mm long, glabrate, apices acute, puberulent. Corolla white, ca 4 mm long, tube gradually expanding into and scarcely distinguishable from the throat, teeth lanceolate, ca 1.2 mm long. Achene (immature)

ca 1.8 mm long. Pappus bristles ca 30-35, ca 4.5 mm long, brownish near the base, gradually turning white and enlarged toward the tip, scabrid.

TYPE: PERU. Loreto. Prov. Maynas. Dtto. Iquitos. Carretera de Zungaro Cocha near Quebrada de Shushuna, September 20, 1978, Manuel Rimachi Y. 3984 (IBE, holotype; AMAZ, F, NATC, US, USM, isotypes).

This new species is characterized by its paniculate inflorescence with heads somewhat racemously disposed toward the tips of the branches. The exterior bracts are linear and borne at the very base of the pedicel. Pappus bristles are bicolored, the bases being tawny or brownish, the tips white and enlarged. The plant apparently turns brownish upon drying.

Comparison with other Peruvian species of *Mikania* has revealed that two other species turn brownish upon drying, *M. stygia*, a plant with ternately disposed heads, and *M. iquitoensis*, a plant certainly with close affinities to *M. shushunensis*. The cuneate leaf bases, corolla with tube and throat scarcely distinguishable, and lanceolate corolla teeth, among other differences suffice to distinguish this plant from *M. iquitoensis* which has acute to obtuse leaf bases, campanulate-turbinate corolla throat, and deltoid corolla teeth.

Other than in turning brown in drying, the leaves of this species are almost exactly like those of *Mikania aschersonii* Hieron. However, that species is easily recognized by its corymbose inflorescence. The habitat of this species is a somewhat disturbed high white sand area notable for interesting species. It was observed in sterile condition in November, 1979, at the type locality. *Mikania shushunensis* was noted at that time to occur in a somewhat open savanna in slightly elevated tussocks of *Trichomanes* and *Adiantum*. Additional material will be collected for distribution. Shushuna is lowland Quechua for sieve.

MIKANIA WEBERBAUERI Hieron., Bot. Jahrb. Syst. 11: 389. 1908. Perú. Huánuco. Huamillies, Monzon, 100-1000 m, July 23, 1903, Weberbauer 3426 (B, holotype, not seen, F, GH, photos).

M. rivularis Robins., Contr. Gray Herb. 73: 30. 1924. Perú. Junín, La Merced, 2000 ft., August 10-24, 1923, Macbride 5414 (F, holotype).

Mikania weberbaueri is known only from the type specimen at Berlin (B) presumed destroyed. Robinson (1922) characterized the plant as having ovate-oblong leaves with long tapering apices, a panicle of somewhat dense glomerules, and pappus bristles distinctly thickened at the summit. He also reported it seemed near M. tambillensis, a species lacking the long tapering leaf apices, but having a shorter stalked inflorescence and pappus bristles not thickened upwards. The species appear to be satisfactorily distinct, at least from the sparse material available for study.

However, difficulty was encountered in separating Mikania weberbaueri and M. rivularis. Clear photos of the type (F, GH) and a line drawing with pencil notations, distinctly in the hand of B. L. Robinson, were available of M. weberbaueri and enabled a somewhat detailed comparison to be made. The leaves of both are identical in texture, margins, venation, types of bases, and even to the long tapering apices. As noted on the drawing of M. weberbaueri and from examination of the type of M. rivularis, both are glabrous. The dense corymbose inflorescences are identical. Robinson (1922) describes M. weberbaueri as having sessile heads, but examination of the photos showed heads both sessile and pedicellate, as occurs in the type material of M. rivularis. Both plants closely agree in characters of exterior bracts and phyllaries. Robinson further describes the corolla of M. weberbaueri as "tube not enlarged upward," which is also true of M. rivularis. Pappus bristles of both are distinctly enlarged at the summit. It readily becomes apparent under detailed comparison that the two plants cannot be adequately separated, therefore only the older name is retained, M. weberbaueri.

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中国苦苣苔科的研究*

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NOTULAE DE GESNERIACEIS SINENSIBUS*

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[This is the second of two translations of articles by Wang Wen-ts'ai describing Chinese Gesneriaceae. "Taxa Nova Gesneriacearum e Flora Tibetica" (Acta Phytotaxonomica Sinica 17(1): 110-111, 1979) appeared in Phytologia 45(1): 31-34, 1980. The present article will be published in two parts, as it appeared in the original; the illustrations will be included in the second part.

[The Wade-Giles system of transliteration has been used throughout. The author's name is properly spelled Wang Wen-ts'ai; future publications from China will use the pinyin system of Romanization, in which the name will be written Wang Wencai. Corrections and additions have been made in starred footnotes or brackets.]

In recent years the writer, in preparing the section on the family Gesneriaceae for the "Icono-

* This article includes photographs by Comrades Chu P'ei-chun and Kao Kuei-chen. The photographs will appear in the next issue. [In original]

graphia Cormophytorum Sinicorum", organized our specimens of this family, and proposed several new taxa and combinations, which are given in this article. All of the specimens cited in this article are contained in our herbarium [PE].

THE SHARP-HAIRED GESNERIAD GENUS --
Aeschynanthus Jack

THE LINEAR-LEAVED AESCHYNANTHUS -- A. linearifolius

Aeschynanthus linearifolia* C. E. C. Fisch. in Kew Bull. 1928: 321 (1928)**.

Tibet: Ch'a-yü, 2500 m above sea level, Ching-hai-Tibet Expedition 73-792.

Yunnan: Kung-shan, 2000-2800 m above sea level, Yü Teh-chün [Yü Te-tsun] 22061, Wang Ch'i-wu 67521.

Distributed in this country in SE Tibet, NW Yunnan; NE India. First recorded from this country.

This species has bracts and calyx (5 lobes divided nearly to the base) entirely red, and the seeds with one hair at each end and is close to A. bracteatus Wall. and the Broad and Long-leaved Aeschynanthus*** -- A. oblanceolatus (Anth.) C. E. C. Fisch. This species has leaves narrowly oblanceolate or elongate oblanceolate (5-7 cm long, 0.7-1.5 cm broad), easily distinguished from the ovate-leaved A. bracteatus. A. oblanceolatus has leaves oblanceolate, 2-2.8 cm broad, and is nearest to this species.

THE SOUTH-YUNNAN AESCHYNANTHUS -- Aeschynanthus austroyunnanensis (illustration will appear in next issue)

Small climbing shrub. Stem ca. 1 m long, glabrous, not divided or with a few short branches. Leaves opposite; leaf blades thinly coriaceous or rigidly chartaceous, elliptic or narrowly elliptic, 4-7.2 cm long, 2.2-3.9 cm broad, apex acute or somewhat obtuse, base broadly cuneate or cuneate

* Sic; linearifolius

** Sic; 1935.

*** Common name; see key.

rotund, margin entire, lateral veins 4-5 and opposite, obscure; petioles thick, 3-6 mm long. Flowers 1-2 borne from buds on reduced axillary branches; peduncles 4-8 mm long, sparsely puberulent; the calyx ca. 4 mm long, outside puberulent, 5 lobes divided to ca. 1 mm from the base, the lobes elongate lanceolate; corolla red, nearly tubular, 2.4-2.8 cm long, slightly curved near the apex, outside puberulent, inside glabrous, limb obscurely bilabiate, upper lip of 2 shallow lobes, lower lip of 3 shallow lobes, the lobes ovate, ca. 3 mm long; stamens 4, borne at the upper part of the corolla tube, slightly exserted, filaments puberulent; disc annular, glabrous, with shallow lobes; pistil slightly exserted from the corolla, style sparsely puberulent. Capsule nearly linear, 18.5-26 cm long, glabrous; seed narrowly oblong, ca. 0.8 mm long, with 1 long white hair at each end (hairs 12-15 mm long).

This species is allied to A. lineatus Craib (distributed in Thailand), but this species can be distinguished by the calyx lobes that are not divided to the base, the lobe apices acute, while the latter has calyx lobes divided to the base, the lobe apices somewhat obtuse.

Aeschynanthus austroyunnanensis W. T. Wang, sp. nov. [Acta Phytotax. Sin. 13(2): 63, 1975]

Affinis A. lineato Craib e descr., sed calyce non ad basin diviso, eius segmentis apice acutis differt.

Yunnan: Ching-hung, Nan-hsien River, 800 m above sea level, on stones by the side of the river, liana, flower red, October 1936, Wang Ch'i-wu 79443 (Holotypus!); I-wu, 880 m above sea level, in a forest, climbing liana, flower red, October 1936, Wang Ch'i-wu 80192.

THE HAIRY-FLOWERED AESCHYNANTHUS -- A. lasianthus (illustration will appear in next issue)

Small shrub. Stem 40-120 cm long, branched, glabrous, youngest branches with brown sericeous pubescence. Leaves opposite, glabrous; the leaf blades thin coriaceous, ovate, narrowly ovate or ovate lanceolate, 3.7-6.5 cm long, 1.5-2.9 cm broad, apex acuminate, base broadly cuneate, margin entire, veins obscure; the petioles 3.5-7 mm long. Flowers

1-2 from buds on extremely reduced axillary branches; peduncles 1-1.4 cm long, with dense brown sericeous pubescence; calyx campanulate, 1-1.8 cm long, outside with dense sericeous pubescence, 5 lobes divided slightly past the middle or near the base, the lobes elongate lanceolate; corolla red, tubular funnelform, slightly curved, 2.2-2.5 cm long, outside with sericeous puberulence, inside at the base and above sparsely puberulent, limb of 5 nearly equal lobes, the lobes deltate ovate, ca. 2.2 mm long, apex rotund; stamens 4, borne from the middle of the corolla tube, strongly exerted from the corolla, filaments' upper part sparsely pubescent, anthers coherent in pairs; disc nearly tubular, glabrous; pistil glabrous or nearly glabrous, style strongly exerted from the corolla. Capsule ca. 20 cm long.

This species is close to the aforementioned A. austroyunnanensis, but it differs by the leaves which are ovate, not elliptic, apex acuminate, and the calyx relatively much longer.

Aeschynanthus lasianthus W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(2): 63, 1975]

Affinis A. austroyunnanensis W. T. Wang, sed foliis ovatis apice acuminatis, calyce multo longiore differt.

Yunnan: Kung-shan, Pei-hai-lo, 2300-2600 m above sea level, herb, 5 m long, on rocky cliffs at the side of a stream, flower red, 1 September 1940, Feng Kuo-mei 7282 (Holotypus!); same place, Kao-li Kung-shan, 1800 m above sea level, in a tree at the edge of a forest, epiphytic shrub, 1 ft long, flower red, 27 August 1937, Yü Teh-chün [Yü Te-tsun] 19973.

THE NARROWLY-OBLONG-LEAVED AESCHYNANTHUS -- A. angustioblongus (illustration will appear in next issue)

Epiphytic small shrub. Stem 12-30 cm long, glabrous, frequently with long branches. Leaves opposite, glabrous; leaf blades rigidly chartaceous, narrowly oblong, oblong lanceolate or narrowly elliptic, (1.8-)3-5.4 cm long, (0.8-)1-1.5 cm broad, two ends gradually narrowing, apex somewhat obtuse, margin entire; the petioles 2-5 mm long. Flowers frequently simple axillary; peduncles 1-2.2 cm long, glabrous; the calyx 9-11 mm long, 5 lobes divided to

the base, the lobes linear lanceolate, 1.6-2.1 mm broad, apex somewhat obtuse, with sparse short marginal hairs, corolla red, nearly tubular, slightly curved, 2.8-3 cm long, outside puberulent, inside glabrous, limb suberect, of 5 nearly equal lobes, the lobes ovate, ca. 2 mm long, apices rotund; stamens 4, borne at above the middle of the corolla tube, exserted, filaments puberulent; disc annular, glabrous, margin denticulate; pistil slightly exserted, style puberulent.

This species is close to A. lineatus Craib endemic to Thailand, but this species can be distinguished by the leaves that are narrowly oblong, to 1.5 cm broad, calyx lobe apices acute, while the latter has leaves lanceolate or oblanceolate, or sometimes oblong, 1.7-3.3 cm broad, calyx lobe apices somewhat obtuse. This species is also close to A. lasianthus (see above), but it can be distinguished by the leaves that are narrowly oblong, relatively smaller, and the calyx with marginal hairs only at lobe apex.

Aeschynanthus angustiolongus W. T. Wang, sp. nov. [Acta Phytotax. Sin. 13(2): 64, 1975]

Affinis A. lineato Craib e descr., sed foliis anguste oblongis ad 1.5 cm latis, calycis segmentis apice acutis differt; ab A. lasiantho W. T. Wang foliorum forma latitudineque, calyce segmentis apice tantum ciliatis exceptis glabro distinctus.

Yunnan: Kung-shan, Ch'iu Chiang River valley, 1500 m above sea level, shrub epiphytic on a tree trunk, flower red, 25 September 1938, Yü Teh-chün [Yü Te-tsun] 20424 (Holotypus!).

THE LONG-ACUMINATE AESCHYNANTHUS -- A. acuminatissimus

Small epiphytic climbing shrub. Stem branched, glabrous. Leaves opposite, glabrous; leaf blades thin coriaceous, lanceolate, 5.8-7.4 cm long, 1.4-2.5 cm broad, the apices long acuminate or nearly caudate, tip sometimes falcate curved, base obtuse or slightly rotund, margin entire, veins obscure, abaxial side densely covered by light brown spots; petioles 3-4 mm long. Flowers single and axillary; the peduncles ca. 1 cm long,* glabrous; calyx cam-

*Sic; differs from corresponding Latin description.

panulate, ca. 7.5 mm long, glabrous, 5 lobes divided to the base, the lobes lanceolate subulate, ca. 0.8 mm broad, with 1 vein; the corolla red, funnelform tubular, slightly curved, ca. 2.8 cm long, outside glabrous, tube ca. 2.2 cm long, limb obscurely bilabiate, of 5 nearly equal lobes, the lobes ovate, inside puberulent, ca. 6 mm long; the stamens 4, borne above the middle of the corolla tube, elongate to the corolla mouth, filaments sparsely puberulent, anthers ca. 2 mm long; disc annular, glabrous; the pistil glabrous, as long as the corolla, stigma depressed orbicular.

This species is allied to A. tenuis Hand.-Mazz., but it can be distinguished by having leaves relatively large, leaf blades 5.8-7.4 cm long, apices long acuminate, rarely nearly caudate, abaxial side densely covered with small, light brown spots, flowers simple and axillary, without peduncles; A. tenuis has leaves 3-5.5 cm long, apices caudate, without spots, inflorescences of 1-2 flowers, with peduncles.

Aeschynanthus acuminatissimus W. T. Wang, sp. nov. [Acta Phytotax. Sin. 13(2): 64, 1975]

Affinis A. tenui Hand.-Mazz., sed foliis majoribus apice longe acuminatis raro subcaudatis subtus sub lente dense brunneolo-punctatis, flore singulari axillari, pedunculo nullo* differt.

Yunnan: Hsi-ch'ou, Fa-t'ou, Shui-ching-shih Creek, 1500 m above sea level, in an immature rain forest, liana borne on a tree trunk, flower red, slightly labiate, 4 August 1964, Chang Chih-yu 46 (Holotypus!).

THE LANCEOLATE-LEAVED AESCHYNANTHUS -- A. lanci-
limbus

Small shrub. Stem glabrous, with long branches. Leaves opposite, glabrous; the leaf blades coriaceous or rigidly chartaceous, lanceolate, rarely ovate, 4-6.3 cm long, 1.4-2.5 cm broad, apices long* acuminate or acuminate, base obtuse or nearly rotund, margin entire, veins obscure; the petioles 3-6 mm long. Flowers axillary (?); peduncles ca.

*Sic; differs from the corresponding Latin/Chinese description.

1.3 cm long, glabrous; the calyx campanulate, ca. 7 mm long, glabrous, 5 lobes divided to ca. 2 mm from the base, the lobes elongate lanceolate, 1-1.5 mm broad; the corolla red, funnelform tubular, slightly curved near the apex, ca. 2.7 cm long, outside slightly puberulent, inside glabrous, the limb sub-erect, of 5 nearly equal lobes, the lobes elliptic ovate, ca. 2 mm long; stamens 4, borne from the upper part of the corolla tube, strongly exserted from from the corolla, glabrous, anthers coherent in pairs, narrowly oblong, ca. 2.5 mm long; disc annular, glabrous; pistil glabrous.

This species is close to A. acuminatissimus (see above), but it can be distinguished by the leaf apices short acuminate, calyx lobes not divided to the base, and corolla exterior puberulent.

Aeschynanthus lancilimbus W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(2): 64, 1975]

Affinis A. acuminatissimo W. T. Wang, sed foliis apice brevius* acuminatis, calyce non ad basin diviso, corolla extus puberula differt.

Yunnan: Yen-shan, 1200 m above sea level. in a mountain ravine, in a dense forest, flower red, 27 October 1939, Wang Ch'i-wu 84791 (Holotypus!).

THE SLENDER AESCHYNANTHUS -- A. novogracilis

Aeschynanthus novogracilis W. T. Wang, nom. nov.
[Acta Phytotax. Sin. 13(2): 65, 1975] **

A. gracilis Parish ex Clarke, Comm. et Cyrt. Beng. t. 48, fig. infer. (1874); in DC. Monogr. Phan. 5: 27 (1883); in Hook. f. Fl. Brit. Ind. 4: 340 (1884); Hara, Fl. East. Himal. 297 (1966), non Hort. ex Hanst. (1864).

*Sic; differs from the corresponding Chinese description.

**Aeschynanthus novogracilis W. T. Wang is probably superfluous by application of the International Code of Botanical Nomenclature as it is an avowed substitute for an illegitimate name. A. gracilis Hort. ex Hanst. is a nomen nudum only listed in synonymy.

Yunnan: Meng-tzu, fruit, Liu Sheng-o [Liu Tchen-ngo] 18915; P'ing-pien, 1700 m above sea level, on stones at the edge of a forest, fruit green, 15 October 1939, Wang Ch'i-wu 82510.

Distribution: This country in S Yunnan; Sikkim; Bhutan; NE India; Burma. First recorded from this country.

The two above described specimens in fruit agree with that drawn and described in Clarke's discussion of this species. This species' distinguishing characteristics are branches with dense patent pubescence, leaves small (1.5-3.4 cm long, 4-7 mm broad), lanceolate or oblong lanceolate, both sides with a complete dense pubescence. It is very close to A. levipes (see below), but the latter has leaves even smaller, narrowly lanceolate or elongate lanceolate, 1.3-2.6 cm long, 1-4.5 mm broad.

THE SMALL-LEAVED AESCHYNANTHUS -- A. levipes

Aeschynanthus levipes Clarke in DC. Monogr. Phan. 5: 28 (1883); in Hook. f. Fl. Brit. Ind. 4: 341 (1884); Prain in Rec. Bot. Surv. Ind. 1: 255 (1898); Marq. in Journ. Linn. Soc. Bot. 48: 214 (1929).

Yunnan: Kung-shan, Kao-li Kung-shan, 1200 m above sea level, on a tree trunk in a dense forest, 26 September 1938, Yü Teh-chün [Yü Te-tsun] 20454.

Distribution: This country in SE Tibet, NW Yunnan; N Burma, NE India. First recorded from Yunnan in this country.

THE DENTICULATE AESCHYNANTHUS -- A. denticuliger
(illustration will appear in next issue)

Epiphytic small climbing half shrub. Stem slender, diameter ca. 1 mm, bearing roots, with somewhat dense pubescence, with long branches. Leaves opposite or in whorls of 3; the leaf blades elliptic, obovate elliptic or obovate, [veins?] slightly not opposite, 10-19 mm long, 6-10 mm broad, apices acute or acuminate, base broadly cuneate, margin at the middle and above sparsely denticulate, adaxial side glabrous or nearly glabrous, abaxial side with somewhat dense pubescence; the petioles 1.5 mm long, pubescent. Flowers axillary (?); the calyx campanu-

late, ca. 4 mm long, outside densely puberulent, 5 lobes divided to near the base, the lobes triangular lanceolate; the corolla yellow, funnelform, ca. 3.4 cm long, outside with somewhat dense puberulence, inside glabrous, tube ca. 2.6 cm long, becoming slender near the base, limb bilabiate, upper limb ca. 7 mm long, 2 lobed, lower lip ca. 9 mm long, of 3 deep lobes, the lobes oblong ovate; stamens 4, borne at near the middle of the corolla tube, elongated to the corolla mouth, glabrous, anthers coherent at the apices, narrowly oblong, 3 mm long; disc cupulate, glabrous; pistil glabrous.

This species is near A. novogracilis W. T. Wang, but this species can be easily distinguished by its having leaves elliptic or obovate elliptic, margin denticulate, and corolla yellow; A. novogracilis has leaves lanceolate or oblong lanceolate, margin entire and flowers red.

Aeschynanthus denticuliger W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(2): 65, 1975]

Affinis A. novogracili W. T. Wang, sed foliis ellipticis vel obovato-ellipticis denticulatis, corolla flava facile differt.

Yunnan: Hsi-ch'ou, Fa-t'ou, 1200 m above sea level, in a dense forest, epiphytic on a 21.34 m tall Quercus tree, flower yellow, 12 December 1939, Wang Ch'i-wu 85615 (Holotypus!).

THE CLUSTER-FLOWERED AESCHYNANTHUS -- A. hookeri

Aeschynanthus hookeri Clarke in DC. Monogr. Phan. 5: 21 (1883); in Hook. f. Fl. Brit. Ind. 4: 338 (1884); Hara, Fl. East. Himal. 297 (1966); ibid. 2nd rep.: 121 (1971).

A. parasitica auct. non Wall.: Clarke, Comm. et Cyrt. Beng. t. 49 (1874).

Yunnan: Meng-hai, 1900 m above sea level, in a forest on a dried tree trunk, flowers of deep red, Wang Ch'i-wu 77347.

Distribution: This country, in S Yunnan; Sikkim. First recorded from this country.

The identifying characteristics of this species are flowers that grow near the tips of the plant, with an appearance much like an umbellate inflores-

cence, the flower's calyx has 5 shallow lobes, and at near the base of the seed are 2 hairs, and at the apex 1 hair. For the foregoing specimen we can only describe the flower, for we have not yet seen the seed. This species is fairly close to A. mimetes Burt, although in the flowers of the latter species the calyx has lobes elongate lanceolate, with the apices pointed, the corolla relatively large, ca. 4.8 cm long, nearly glabrous, while in this species the calyx lobes are broadly ovate, the apex rotund, the corolla relatively small, ca. 3 cm long, with a dense puberulence outside.

The genus Aeschynanthus has about 140 species, distributed from southeastern Tibet in this country, Sikkim, Bhutan, and from eastern India eastward to Indonesia. This country has about 23 species, distributed through southeastern Tibet, Yunnan, Szechuan (Omei is the northern limit of this genus), Kweichow, Kwangsi and Kwangtung, with many species in Yunnan. Below is a key based on the specimens of this genus collected by the Botanical Institute of the Academia Sinica in Peking.

1. The calyx of 5 shallow lobes from 1/4 to 1/3 the total length of the calyx; the leaves coriaceous, more or less 10 cm long, and glabrous. (S Yunnan).
 2. The calyx lobes broadly ovate, the apex rotund, with ciliate hairs; the corolla ca. 3 cm long, and outside densely puberulent THE CLUSTER-FLOWERED AESCHYNANTHUS -- A. hookeri Clarke
 2. Calyx glabrous, the lobes elongate lanceolate, the apex pointed; the corolla ca. 4.8 cm long, nearly glabrous THE LARGE-FLOWERED AESCHYNANTHUS -- A. mimetes Burt
1. The calyx of 5 lobes divided to past the middle or to the base.
 3. The calyx ca. 3 cm long, with 5 lobes divided to the base, the lobes elongate oblong, and the apex blunt; the corolla ca. 9 cm long; the leaves chartaceous, oblong, more or less 15 cm long, and glabrous. (Yunnan) THE CHINESE-BEAUTY AESCHYNANTHUS -- A. superbus Clarke

3. The calyx 1.5 cm or less long, the corolla 4 cm or less long.
4. Calyx 5-7 mm long, glabrous, lobes ovate, the apex rotund or nearly rotund; the leaves chartaceous, glabrous, and 4.5-13 cm long.
5. The leaves often oblong; the peduncles 0.8-3 cm long (Kwangtung, Kwangsi, Yunnan, Szechuan) AESCHYNANTHUS -- A. acuminatus Wall.
5. The leaves often elliptic; the peduncles 6-15 cm long (Kwangtung in Hainan) THE HAINAN AESCHYNANTHUS -- A. moningeriae (Merr.) Chun
4. The calyx lobes oblong, linear, narrowly lanceolate, or subulate, the apex pointed or obtuse.
6. Dichasia pedunculate, with several flowers; the bracts purple-red, ovate or narrowly ovate, 1-2 cm long; the calices purple-red, and glabrous, with 5 lobes divided to the base, the lobes oblong or elongate oblong, the apex commonly obtuse; the leaves glabrous.
7. Leaves ovate or elliptic (SE Tibet, Yunnan) THE VISIBLE-BRACTED AESCHYNANTHUS -- A. bracteatus Wall.
7. Leaves oblanceolate, narrowly oblanceolate or elongate oblanceolate.
8. Leaves elongate oblanceolate, 0.7-1.5 cm broad (SE Tibet, NW Yunnan) THE LINEAR-LEAVED AESCHYNANTHUS -- A. linearifolius C. E. C. Fisch.
8. Leaves oblanceolate or narrowly oblanceolate, 2-2.8 cm broad (W Yunnan) THE OBLANCEOLATE AESCHYNANTHUS -- A. oblanceolatus (Anthony) C. E. C. Fisch.
6. The flowers borne in axillary clusters of 1-3 (only in A. tenuis are the inflorescences pedicellate); the bracts small, linear, or caducous; the calyx apparently not dark red, the lobes linear, elongate lanceolate or subulate.
9. The leaves (3.5-) 4 cm or more long, glabrous.

10. The leaf margin 1-2 toothed toward the apex (N Kwangtung) THE APICALLY-TOOTHED AESCHYNANTHUS -- A. apicidens Hance
10. The leaf margin entire.
11. The outside of the calyx puberulent.
12. The calyx has five lobes divided to the base, the lobe apex obtuse (W and SW Yunnan) The SEPARATED-CALYX AESCHYNANTHUS -- A. chorisepalus Orr
12. The calyx has 5 deep lobes reaching to within 1-2.5 mm of the base, the lobe apex pointed.
13. The leaves ovate, the apex acuminate; the calyx 7.5-11 mm long (NW Yunnan) THE HAIRY-FLOWERED AESCHYNANTHUS -- A. lasianthus W. T. Wang
13. The leaves elliptic, the apex acute or somewhat obtuse; the calyx 4-6 mm long (S Yunnan) THE SOUTH-YUNNAN AESCHYNANTHUS -- A. austroyunnanensis W. T. Wang
11. The outside of the calyx glabrous.
14. The 5 lobes of the calyx divided to the base, the lobes linear, the apex obtuse, with a few marginal hairs.
15. The leaves coriaceous, commonly narrowly ovate, sometimes broadly lanceolate or lanceolate, 2.8-4 cm broad, the apex acuminate (W and SW Yunnan) The SEPARATED-CALYX AESCHYNANTHUS -- A. chorisepalus Orr
15. The leaves chartaceous, narrowly oblong, 1.5 cm or less wide, the apex somewhat obtuse (NW Yunnan) THE NARROW-OBLONG-LEAVED AESCHYNANTHUS -- A. angustioblongus W. T. Wang

14. The lobes of the calyx are linear subulate or subulate, the apex pointed, glabrous.

16. The calyx has 5 deep lobes not divided to the base; outside of the corolla puberulent; leaves lanceolate, the apex acuminate (SE Yunnan) ...

..... THE LAN-
CEOLATE-LEAVED AESCHYNANTHUS

-- A. lancilimbus W. T. Wang

16. The calyx has 5 lobes divided to the base; the corolla glabrous.

17. The leaves lanceolate, 5-7.5 cm long, the apex long acuminate or caudate and acuminate, the abaxial side is densely maculate with small light brown spots; single flowers arise from the axil, the pedicels ca. 1 cm long, without peduncle (SE Yunnan)

..... THE LONG-ACUMINATE

AESCHYNANTHUS -- A.

acuminatissimus W. T. Wang

17. The leaves are ovate, lanceolate or elliptic lanceolate, 3-5.5 cm long, the apex caudate, the abaxial side without spots; the inflorescence of 1-2 flowers, with peduncles present, 3-4.3 (-5.8) cm long (NW Yunnan)

..... THE

CAUDATE-LEAVED AESCHYNAN-

THUS - A. tenuis Hand-Mazz.

9. The leaves 3 cm or less long.

18. The stem and branches, leaves, and the calyx glabrous, or sometimes the calyx lobes with short marginal hairs.

19. The leaves ovate or lanceolate, the apices caudate; inflorescences with peduncles 3-4.3 (-5.8) cm long (NW Yunnan) THE CAUDATE-LEAVED AESCHYNANTHUS -- A. tenuis Hand.-Mazz.
19. The leaf apex obtuse or rotund.
20. The leaves chartaceous, narrowly oblong; the calyx lobes with a few short marginal hairs (NW Yunnan) THE NARROW-OBLONG-LEAVED AESCHYNANTHUS -- A. angustiolongus W. T. Wang
20. The leaves coriaceous, elliptic, broadly elliptic or obovate; the calyx glabrous (SE Yunnan, Kwangsi) THE YELLOW POPLAR-LEAVED AESCHYNANTHUS -- A. buxifolius Hemsl.
18. The stem, branches, leaves and the outside of the calyx all covered with hairs.
21. The leaves elongate lanceolate or oblong lanceolate, margin entire; the calyx with 5 lobes divided to the base.
22. The leaves elongate lanceolate, 3 mm or less broad (SE Tibet, NW Yunnan) THE SMALL-LEAVED AESCHYNANTHUS - A. levipes Clarke
22. The leaves lanceolate or oblong lanceolate, 4-7 mm broad.
23. The leaves all opposite, lanceolate, the apex pointed (S Yunnan) THE SLENDER AESCHYNANTHUS -- A. novogracilis W. T. Wang
23. The leaves at the stem apex nearly whorled, oblong lanceolate, the apex blunt (SW Yunnan) THE WHORLED-LEAVED AESCHYNANTHUS - A. andersonii Clarke
22. Leaves of some other shape.

24. The stem slender, and not erect; the leaves opposite or in whorls of 3, elliptic or obovate elliptic, the margin denticulate; calyx with 5 lobes divided to the base; corolla yellow (SE Yunnan) ...

..... THE

DENTICULATE AESCHYNANTHUS

-- A. denticuliger W. T. Wang

24. The stem relatively stout, erect; the lower part of the stem with leaves opposite, the upper part with some leaves at the stem's apex nearly whorled, spatulate or oblong spatulate, the margin entire, however leaves on the lower stem obscurely denticulate; the corolla red.

25. The leaves spatulate or oblong spatulate; the 5 calyx lobes divided to just past the middle (SE Yunnan)

..... THE SHORT AESCHYNANTHUS - A. humilis Hemsl.

25. A few of the leaves apparently spatulate, most oblong lanceolate; the 5 calyx lobes divided to the base (SW Yunnan)

THE WHORLED-LEAVED AESCHYNANTHUS - A. andersonii Clarke

THE ROCK-HANGING GESNERIAD GENUS --

Lysionotus G. Don

THE KWANGSI LYSIONOTUS -- L. kwangsiensis (illustration will appear in next issue)

Small shrub, each part glabrous. Stems ca. 30 cm long, nearly terete, ca. 3 mm in diameter, smooth, lenticels sparse and elliptic. Leaves opposite; leaf blades coriaceous, elliptic ovate or elliptic, 6-10 cm long, 3.4-4.5 cm broad, apex with many short

tapered teeth, nearly obtuse, base slightly oblique, rotund or broadly cuneate, margin above the base denticulate, lateral veins 5-7 and opposite, obscure; petioles 0.9-1.5 cm long. Cymes axillary, of 1-2 flowers; the peduncles 1.5-4 cm long, quadrangular, very narrowly winged; the bracts narrowly elliptic, ca. 5 mm long, margin crenate*; pedicels 1.2-2 cm long; the calyx ca. 1 cm long, of 5 lobes divided to the base, the lobes linear lanceolate, ca. 1.2 mm broad; corolla light purple, ca. 4.5 cm long, tubular funnelform, limb bilabiate, upper lip ca. 6 mm long, with 2 shallow lobes, the lobes broadly ovate, lower lip 13 mm long, with 3 shallow lobes; stamens 2, included, filaments narrowly linear, coiled at middle, anthers coherent, nearly orbicular, ca. 2 mm in diameter, connectives with protuberance at the back; staminodia 2, narrowly linear, ca. 10 mm long; disk annular, margin with shallow lobes; pistils ca. 2.3 cm long.

This species is allied to L. hainanensis Merr. et Chun, but can be distinguished by the leaves that are opposite, elliptic ovate or elliptic, calyx 5-lobed divided to the base, the lobes linear lanceolate, while the leaves of the latter are borne in whorls of 3, oblong or narrowly elliptic, calyx with 5 deep lobes, but not divided to the base, the lobes narrowly triangular. It is also allied to the Visible-bracted Lysionotus** -- L. serratus D. Don, but its leaves are coriaceous, inflorescences with few flowers, bracts narrowly elliptic, denticulate,* the calyx lobes linear lanceolate, while the leaves of the latter are herbaceous, the inflorescences with relatively many flowers, the bracts broadly ovate, margin entire, the calyx lobes ovate or narrowly ovate.

Lysionotus kwangsiensis W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(2): 68, 1975]

Affinis L. hainanensi Merr. et Chun, sed foliis oppositis latioribus elliptico-ovatis vel ellipticis, calyce ad basin in segmenta 5 lanceolato-linear-ia diviso differt; a L. serrato D. Don foliis coriaceis, cyma pauciflora, bracteis anguste ellipticis crenulatis,* calycis segmentis lanceolato-linearibus recedit.

*Sic; differs from the corresponding Chinese/Latin description.

**Common name; see key.

Kwangsi: Jung-shui, Shan-fang, Pen-tung, Chiu-wan Mt., 1360 m above sea level, on rocks in a thin forest on a mountain top, corolla tube with light maroon sutures ? , 21 July 1958, Ch'en Shao-ch'ing 15021 (Holotypus!); same place, 1300 m above sea level, on a mountain top, in a dense forest, 26 July 1958, Ch'en Shao-ch'ing 15846.

THE VARIED-LEAVED LYSIONOTUS -- L. heterophyllus

Lysionotus heterophyllus Franch. in Bull. Mus. Hist. Nat. Paris 5: 249 (1889).

L. brachycarpus Rehd. in Sarg. Pl. Wils. 3: 387 (1916), syn. nov.

var. heterophyllus

Szechuan: Omei Mt., Yao Chung-wu 5296, Yang Kuang-hui 56639, 57425; O-pien, Liu Sheng-o [Liu Tchen-ngo] 12577, Yao Chung-wu 2789; T'ien-ch'uan, Erh-lang Mt., Hu Wen-kuang and Ho Chu 11634; Hung-ch'i, 2300 m above sea level, Hu Chia-ch'in et al. 1177, 1455; Nan-ch'uan, 1700-2600 m above sea level, P'ei Chien 7202, Ch'ü Chung-hsiang 1439, Hsiung Chi-hua and Chu Tzu-lin 92187, Li Kuo-feng 62921; unspecified locality, A. Henry 8997 (picture seen, L. brachycarpus Rehd. paratype).

Distribution: NE Yunnan, Szechuan.

The type of this species was collected by Delavay in northeast Yunnan, but we have not seen this specimen, however the aforementioned Szechuan specimens agree with the original description. L. brachycarpus Rehd. described later, is united here.

THE HAIRY-LEAVED LYSIONOTUS (variety)-- L. heterophyllus var. mollis

The small branches, petioles and abaxial sides of the leaf blades of this variety are all relatively densely puberulent. In typical L. heterophyllus, the small branches, petioles and leaf blades are glabrous.

var. mollis W. T. Wang, var. nov. [Acta Phytotax. Sin. 13(2): 69, 1975]

A var. heterophyllo ramulis petiolis et foliorum laminis subtus densiuscule pubescentibus differt.

Szechuan: Mt. Omei, Ch'u-tien, 1700 m above sea level, flower white, 26 July 1935, Tu Ta-hua 512 (Holotypus!).

The genus Lysionotus contains about 18 species, distributed from Nepal, and northern India to Malaysia, north to T'ai-ling in this country and the tropical and subtropical areas of Japan. This country has 12 species, of which I have specimens of 11 species in this collection, and these 11 species are given in the key below.

1. Branches small and glabrous.

2. Leaves all opposite.

3. Leaves herbaceous, many narrowly elliptic, to 17 cm long, to 5 cm broad, margin commonly toothed; inflorescences commonly of 3-9 flowers; bracts ovate or broadly ovate, to 8 mm broad, margin entire; calyx lobes narrowly ovate, 2.5-3.5 mm broad (Yunnan, SW Kweichow; N Vietnam to Nepal) THE TOOTHED-LEAVED LYSIONOTUS -- L. serratus D. Don
3. Leaves coriaceous; inflorescences of 1-2 flowers; bracts not ovate; calyx lobes linear, 1-1.1 mm broad.

4. Margin denticulate; bracts elliptic, ca. 5 mm long, ca. 3 mm broad, margin crenate (Kwangsi) THE KWANGSI LYSIONOTUS -- L. kwangsiensis W. T. Wang
4. Margin entire; bracts linear, ca. 1 mm long, ca. 0.5 mm broad, margin entire (Szechuan in O-pien, area from Omei to Kuan county) THE WEST-SZECHUAN LYSIONOTUS -- L. wilsonii Rehd.

2. Leaves in whorls of 3, or at the same time with some opposite, or in groups of 4-8 borne at the apex of the branch.

5. Calyx of 5 lobes divided slightly past the middle, the lobes triangular.

6. Leaves often narrowly elliptic, 4.5-9 cm long, 2.4-3.8 cm broad, margin shallowly undulate, or rarely with a few small sharp teeth, petioles 5-10 mm long (Hainan in Kwangtung, Kwangsi) THE HAINAN LYSIONOTUS -- L. hainanensis Merr. et Chun

6. Leaves ovate, elliptic, sometimes nearly oblong, 2-6.5 cm long, 1.2-3 cm broad, margin at the middle and above with coarse teeth, petioles 1.5-5 mm long (SE Yunnan) ..
 THE
 MENG-TZU LYSIONOTUS -- L. carnosus Hemsl.
5. Calyx of 5 lobes divided nearly to the base, the lobes linear lanceolate, but in L. pauciflorus sometimes triangular subulate.
7. Leaves oblong to linear, 1.2-5.5 cm long, 0.3-1.6 cm broad, margin from the middle and above with a few teeth (E Yunnan, Szechuan, Kweichow, Kwangsi, Kwangtung, Fukien, Taiwan, Chekiang, Kiangsi, Hunan, Hupei, S Shensi, Anhwei; N Vietnam, Japan) .
 LYSIONOTUS (Rock-hanging Orchid) -- L. pauciflorus Maxim.
7. Leaves elliptic, narrowly elliptic or narrowly ovate.
8. Leaves in groups of 4-8 borne at the apex of the branch, 1.2-6.5 cm long, 0.7-2.5 cm broad, margins nearly entire or obscurely denticulate; inflorescences of 1-2 (-4) flowers; corolla tube funnel-form, ca. 1 cm thick (NE Yunnan, Szechuan) THE VARIED-LEAVED
 LYSIONOTUS -- L. heterophyllus Franch.
8. Leaves in whorls of 3 or at the same time opposite, 5.5-12 cm long, 2-5.5 cm broad, margin with many sharp teeth; inflorescences of 3-7 flowers; corolla tube cylindric, ca. 5 mm thick (NW Yunnan in the area from Fu-kung to Kung-shan)
 THE SHORT-PETIOLED
 LYSIONOTUS -- L. sessilifolius Hand.-Mazz.
1. Branches small and with an indument.
9. Leaves coriaceous; bracts elongate lanceolate, ca. 0.5 mm broad.
10. Small branches with patent hairs; leaves narrowly elliptic or narrowly ovate, 2-7 cm long, 1-2.4 cm broad, margin obscurely denticulate, abaxial side puberulent (Szechuan at Omei Mt.)
 THE HAIRY-LEAVED LYSIONOTUS
 -- L. heterophyllus var. mollis W. T. Wang

10. Small branches with short appressed hairs; leaves oblong to linear, 1.2-5.5 cm long, 0.3-1.6 cm broad, margin dentate at the middle and above, glabrous (distribution as above)
 LYSIONOTUS -- L. pauciflorus Maxim.

9. Leaves herbaceous, margin toothed.

11. Leaves relatively large, narrowly elliptic or elliptic ovate, to 8 cm long, to 3.2 cm broad, margin both sides with 10 small teeth; bracts subulate, ca. 0.6 mm broad; calyx lobes linear lanceolate (W Yunnan)
 THE WEST-YUNNAN LYSIONOTUS -- L. forrestii W. W. Sm.

11. Leaves relatively small, narrowly ovate, 1-2.5 cm long, 4-9 mm broad, margin both sides with 2-4 small teeth.

12. Small branches with appressed hairs; inflorescences of 1 flower; bracts subulate lanceolate, 1-1.5 cm long, not 1 mm broad; calyx lobes linear lanceolate; corolla glabrous (NW Yunnan in the area from Wei-hsi to Kung-shan)
 THE SMALL-LEAVED LYSIONOTUS -- L. sulphureus Hand.-Mazz.

12. Small branches with dense and patent puberulence; inflorescences of 2 flowers; bracts broadly ovate, ca. 4 mm long, ca. 3.5 mm broad; calyx lobes narrowly ovate; corolla puberulent (NW Yunnan in the area of Kung-shan; N Burma) THE HAIRY-BRANCHED LYSIONOTUS -- L. wardii W. W. Sm.

(Continued)

CERTAMEN MELASTOMATACEIS XXXI.

John J. Wurdack

U. S. National Herbarium, Smithsonian Institution

Most of the current notes reflect neotropical francophilia; an outpouring of recent collections, particularly those of the ORSTOM foresters (Cremers, de Granville, Oldeman) and Sastre, have stocked herbaria with rare species, as well as providing many new records for French Guiana. One still obscure species, Bellucia cacin (Aublet) Sagot, has been collected several times in very young bud and fruit; obviously a transfer to either Miconia or Tococa is needed, but flowers at anthesis are still unknown. Attention is now turning to another disappearing lacuna in modern melastome collections, Bahia, Brazil.

TIBOUCHINA BAHIENSIS Wurdack, sp. nov.

Sect. Pleroma. Speciebus 46-56 Monographiae Cogniauxii affinis, foliorum pilis valde barbellatis differt.

Ramuli sulcato-tetragoni non alati sicut petioli laminarum subtus venae primariae inflorescentiae axis et rami modice pilis pinoideis (0.1-)0.2-0.3(-0.4) mm longis setulosi. Petioli 1.5-3.5 cm longi; lamina 6-13 X 3.5-6.5 cm elliptico-ovata apice hebeti-obtusum vel rotundatum basi ca 0.5 cm cordulata, rigida, supra pilis barbellato-ciliolatis 0.5-1 mm longis densiuscule et laxiuscule strigulosa, subtus in superficie pilis stellulato-pinoideis ca 0.3 mm longis dense setulosa, 7-nervata nervis primariis lateralibus usque ad basim omnino liberis nervis secundariis ca 2-4 mm inter se distantibus. Panicula 20-30 cm longa oblonga submultiflora; flores 5-meri, pedicellis ad anthesim ca 3 mm longis; bracteolae 2-4 mm longae ellipticae caducae. Hypanthium (ad torum) 4.5-5 mm longum pilis 0.3-0.5(-1) mm longis laevibus subappressis modice armatum; calycis tubus ca 0.5 mm longus, lobis ca 4-4.5 X 1.5-2 mm oblongo-lanceatis intus glabris demum deciduis. Petala 16-20 X 11-14 mm obovata apicem versus ciliolata alioqui glabra. Stamina paulo dimorphica; filamenta 5.5-6.4 mm vel 4.5-5.2 mm longa sparse glanduloso-puberula pilis ca 0.2 mm longis. Stamina maiora: thecae 5.3-5.5 X 0.5 mm; connectivum ca 1.8 mm prolongatum glandulis 0.2-0.4 mm stipitatis 16-20 ornatum, lobis ventralibus ca 0.2 mm longis. Stamina minora: thecae 5-5.3 X 0.7-0.8 mm curvatae; connectivum 1 mm prolongatum ad basim glandulis stipitatis ca 4 ornatum, lobis ventralibus ca 0.3 mm longis. Stylus 8 X 1-0.7 mm sparse appresso-setulosus setulis pro parte minore glanduliferis; ovarium apicem versus dense strigulosum pilis ca 0.5 mm longis eglandulosis.

Type Collection: T. S. Santos 2716 (holotype CEPEC 9612; isotype US), collected in Parque Nacional do Monte Pascoal ("Pico do Monte Pascoal-Porto Seguro"), Bahia, Brazil, 16 January 1973. "Arbusto de 2 m de altura, flor roxa, estames brancas."

Paratype: J. L. Hage 152 (CEPEC, US), from Monte Pascoal, Bahia, Brazil, elev. 538 m, 7 May 1976. "Planta de 3 m de alt. Flores roxas e botões cremes."

All the species of this group known to Cogniaux except one have smooth foliar hairs; T. candolleana (DC.) Cogn., which is sparsely pubescent vegetatively and with 3(-5)-nerved leaf blades acute at the base, has foliar hairs sparsely and obscurely barbellate basally. All the more recently described species of this affinity (T. limoeirensis Brade, T. luetzelburgii Markgraf, T. magdalenensis Brade, T. radula Markgraf, and perhaps T. amoena Herzog and T. rupicola Hoehne) have smooth vegetative trichomes.

TIBOUCHINA MORII Wurdack, sp. nov.

T. bahiensis Wurdack affinis, foliis breviter petiolatis pedicellis hypanthiis sepalisque glanduloso-setulosis differt.

Ramuli sicut ramulorum foliorumque trichomata ut in T. bahiensis. Petioli 0.3-0.5 cm longi crassi; lamina ovato-elliptica apice hebeti-obtusobasi 0.5-0.7 cm cordata, 6-10 X 3.5-5 cm rigida 7(-9)-nervata. Panicula 18-20 cm longa submultiflora; flores 5-meri, pedicellis ca 2-4 mm longis dense setulosis pilis pro parte glanduliferis, bracteolis 2-3 X 0.7-1 mm oblongis caducis. Hypanthium (ad torum) 6 mm longum densiuscule pilis laevibus 0.1-0.3 mm longis setulosum et modice pilis laevibus glanduliferis 0.3-0.8 mm longis appresso-setulosum; calycis tubus ca 0.6 mm longus, lobis ca 7 X 3 mm lanceatis demum deciduis intus glabris. Petala 18-19 X 13-14 mm obovata apicem versus glanduloso-ciliata alioqui glabra. Stamina dimorphica; filamenta 6.5 mm vel 5 mm longa modice glanduloso-puberula. Stamina maiora: thecae 6.2 X 0.6 mm; connectivum 1.2 mm prolongatum glandulis 0.1-0.2 mm stipitatis ca 12-16 ornatum, lobis ventralibus ca 0.1 mm longis. Stamina minora: thecae 6-6.2 X 0.9 mm curvatae; connectivum 0.8 mm prolongatum ad basim glandulis stipitatis 2-4 ornatum, lobis ventralibus 0.2 mm longis. Stylus modice appresso-setulosus, pilis pro parte minore glanduliferis; ovarium apicem versus dense strigulosum, pilis eglandulosis.

Type Collection: S. Mori, L. A. Mattos Silva, & T. S. dos Santos 10726 (holotype CEPEC 14698; isotype US), collected on rocks in disturbed mata hygrophila at Fazenda Pau-brasil ca 5 km northwest of Itamaraju, Bahia, Brazil, 19 Sept. 1978. "Subarbus-to, 1.5 m de altura. Petalas roxas com as bases brancas. O centro da flor também é branca."

While T. bahiensis is obviously closely related, the differences cited in the diagnosis seem of specific importance; also the filaments and style of T. morii are more densely pubescent and the anthers and sepals somewhat larger. The two species are nearly sympatric.

ERNESTIA GRANVILLEI Wurdack, sp. nov.

E. pullei Gleason affinis, foliis amplioribus 7-9-nervatis sepalis longioribus differt.

Ramuli paulo quadrangulati sicut petioli foliorum venae primariae subtus inflorescentiaque dense setulosi (pilis

gracillimis 0.1-0.2 mm longis eglandulosis) modice glanduloso-setulosi (pilis ca 0.2-0.6 mm longis) et sparse glanduloso-setosi (pilis gracilibus 1-2 mm longis). Petioli plerumque 3-5 cm longi; lamina 8-12 X 4-6.5 cm anguste ovata apice anguste acuto basi 0.4-0.8 cm cordata, tenuis et inconspicue ciliolato-serrulata, ubique sparsissime puberula pilis debilibus ca 0.5-0.7 mm longis p. p. glanduliferis, 7-9-nervata nervis secundariis 2-3 mm inter se distantibus. Panicula ca 8 cm longa terminalis sub-multiflora; flores 4-meri, pedicellis 2-3 mm longis, bracteolis ca 0.5-0.7 X 0.1 mm. Hypanthium (ad torum) 4 mm longum modice puberulum (pilis eglandulosis ca 0.1 mm longis) et glanduloso-setulosum (pilis 0.3-1 mm longis); calycis tubus 0.1-0.2 mm longus, lobis 3.5 X 0.6-0.7 mm anguste oblongis. Petala ca 6.5 X 2.5-2.7 mm obovato-oblonga apicem versus glanduloso-ciliolata alioqui glabra. Stamina dimorphica glabra; antherarum thecae subulatae, poro minuto ventraliter inclinato. Stamina maiora: filamenta 5.7-6 mm longa; antherarum thecae 5.2-5.3 X 0.6 mm; connectivum 3.5-3.7 mm prolongatum, ad basim dorsaliter 0.5-0.6 mm calcaratum ventraliter appendice caudato-bifida 3 mm longa ad basim 0.1-0.2 mm coalita instructum. Stamina minora: filamenta 4.3-4.5 mm longa; thecae 4 X 0.5 mm; connectivum 0.8 mm prolongatum dorsaliter paulo (0.2 mm) supra basim 0.2 mm calcaratum ventraliter appendice caudato-bifido 2.5-2.7 mm longa ad basim 0.6 mm coalita armatum. Stigma punctiforme; stylus 10 X 0.2 mm glaber; ovarium (ad anthesim) 2 mm longum 3-loculare glabrum.

Type Collection: J. J. de Granville 3032 (holotype US 2860481; isotype CAY), collected along "tracé de Saül à Carbet Mais. Colline granitique située à 2 km au Nord de Carbet Mitan. Forêt basse sur parois rocheuses au sommet (alt. 500 m environ)," French Guiana, 5-7-1979. "Arbuste de 2 m de haut. Feuilles poisseuses, glanduleuses. Calice vert. Corolle lilas."

Paratype: J. P. Schulz 10293 (US), from "Z-hellig Juliana top," Suriname, alt. ca 1000 m, 2-8-1963. "Struikje, op bijna vert.-granietwand worteland in spleet gevuld met verteerde strooisel, vochtig (tgw druipwater) ged. grootste deel v. jaar. Hier zeer. algemeen. Kroonbl. bijna wit. Zon gedurende deel van daag."

Ernestia pullei has 5(-7)-nerved leaf blades 3.5-4 X 2-3 cm and narrowly triangular calyx lobes 1.5-2 X 1-1.2 mm. Another relative in anther structure, E. glandulosa Gleason (also known from Saül) has few-flowered and lateral inflorescences, as well as smaller flowers (but similar leaf blades). The Suriname paratype of E. granvillei differs in minor particulars (somewhat larger anthers, small stamen connectives slightly more prolonged, calyx lobes 2.8-3 mm long) from the Saül population; the description encompasses only the holotype features. Another related taxon (for future evaluation after more collections) is represented by Schulz & Donselaar 10544 (1 km north of Voltzberg, Coppename River, Suriname), with connectives lacking dorsal spurs and petals with only a single terminal setula.

ERNESTIA SUBGLABRA Wurdack, sp. nov.

E. pullei Gleason affinis, foliorum laminis 7-nervatis in superficie ubique glabris hypanthiis secus costulas sparse glanduloso-setulosis alioqui glabris differt.

Ramuli quadrangulati sicut petioli inflorescentia hypanthiaque sparse pilis erectis 0.3-0.5 mm longis glanduliferis setulosis. Petioli 0.6-1.2 cm longi; lamina plerumque 1.5-2 X 1-1.5 cm ovata apice acuto basi rotundato-truncata vel paullulo (ca 1 mm) cordulata, firme chartacea et distanter ciliolato-serrulata, supra glabra, subtus basim versus secus venas primarias sparse glanduloso-setulosa alioqui glabra, 7-nervata. Panicula 10-15 cm longa foliosa submultiflora; flores 4-meri, pedicellis (ad anthesim) ca 3-5 mm longis, bracteolis ca 1 X 0.6 mm oblongo-triangularibus. Hypanthium (ad torum) 4.3-4.7 mm longum 8-costulatum; calycis tubus 0.2 mm longus, lobis 1.2-1.4 mm longis triangularibus sparse glanduloso-ciliolatis. Petala 9.5-10 X 6-6.5 mm, elliptica (apice obtuso) glabra vel interdum setula unica glandulifera terminata. Stamina dimorphica; filamenta 6.2-6.3 mm vel 4.8-5 mm longa glabra; antherarum thecae subulatae, poro minuto ventraliter inclinato. Stamina maiora: thecae 6.5-6.7 X 0.5 mm; connectivum 3-3.3 mm prolongatum, ad basim dorsaliter 0.25 mm hebeti-calcaratum ventraliter appendice caudato-bifido 2.8-3 mm longum (lobis basaliter inflatis) instructum. Stamina minora: thecae 5.6 X 0.45 mm; connectivum 0.9-1 mm prolongatum, dorsaliter non tuberculatum ventraliter appendice bifida hebeti-acuta 0.6 mm longa armatum. Stigma punctiforme; stylus 11-11.5 X 0.3 mm glaber; ovarium ad anthesim 3-3.5 mm longum (2-)3-loculare glabrum.

Type Collection: J. J. de Granville 2632 (holotype US 2855831; isotype CAY), collected in rocky savanna on southeast slope of Mont St. Marcel, Haut Oyapock, French Guiana, elev. 400-450 m, 31 July 1975. "Sous arbrisseau en coussinet poussant sur les rochers. Feuilles coriaces non charnues, vert foncé à pourpre en dessus, vert clair dessous. Fleurs à corolle mauve. Anthères blanches à appendice lilacé."

Paratype (topotypical): C. Sastre 4455 (P, US), fruiting.

Ernestia pullei has leaf blades with usually only 5 primary nerves and puberulous on both surfaces, hypanthia moderately to densely glandular-setulose, and (at least in Suriname material) ends of the ventral connective appendages aristate in both large and small stamens. The other species of *Ernestia* with 3-locular ovaries seem more distantly related. In eight flowers and fruit of *E. subglabra*, six had 3-celled ovaries, the others 2-celled ovaries.

MERIANIA TETRAMERA Wurdack, sp. nov.

In pubescentiae forma *M. calophyllae* (Cham.) Triana et *M. robustae* Cogn. affinis, floribus tetrameris connectivi appendice dorsali aestivali non evoluta differt.

Ramuli primum rotundato-quadrangulati demum teretes sicut folia subtus inflorescentia hypanthiaque modice rufo-furfuracei pilis subamorpho-pinoideis plus minusve deciduis. Petioli

(1.5-)2.5-4 cm longi; lamina (8-)10-17 X 3-6 cm elliptica apice paulo gradatimque acuminato basi late acuta, firme chartacea et integra, supra glabra, breviter (0.5-0.8 cm) 3-plinervata (pari exteriori tenui inframarginali neglecto) nervis secundariis plerumque 4-5 mm inter se distantibus nervulis obscuris. Inflorescentia 2-3 cm longa pauciflora; flores 4-meri umbellatim aggregati, pedicellis 4-6 mm longis. Hypanthium (ad torum) 4 mm longum teres; calyx 1.2 mm longus truncatus vel obscure (usque ad 0.2 mm) lobatus, dentibus exterioribus non visis. Petala glabra 9 X 3.8-4.2 mm obovato-oblonga apice rotundato. Stamina essentialiter isomorphica glabra; filamenta 6.5-7 mm longa; antherarum thecae 6.3-6.4 X 0.8-0.9 mm curvato-subulatae, poro minuto dorsaliter inclinato; connectivum non prolongatum, calcari dorso-basali 1.6-1.8 mm longo hebeti-acuto. Stigma vix expansum 0.4 mm diam.; stylus 15.5 X 0.25-0.35 mm glaber in ovarii apicem 0.4 mm immersus; ovarium 4-loculare glabrum, collo truncato.

Type Collection: T. S. Santos 973 (holotype CEPEC 5988; isotype US), collected at "Capital, BR-262 a Realeza," Espírito Santo, Brazil, 21 July 1970. "Árvore de 10 m de alt., 12 cm diâm. Fl. com pétalas esbranquiçadas, estames brancos, antera amarela, cálice marron, fr. novos e marrons. Mata."

All the species of Meriania from southeastern Brazil treated in Cogniaux' Monograph (Species 22-31, 36a, 37) have 5-merous flowers and ascending dorsal appendages on the anther connectives in addition to the basal spurs. The two species from this region with similar pubescence both have vegetative differences from M. tetramera and considerably larger flowers. As indicated in studies of the Andean species of Meriania, the absence or presence of the ascending connective appendage does not seem of sectional importance; most species of Meriania have 5-merous flowers, but several 6-merous taxa are known and tetramery is not unexpected. The anther pores of both stamen whorls in M. tetramera are dorsally inclined, thus (in my current stage of development in merianoid understanding) ruling out disposition in Graffenrieda. Only mature flowers and young fruits of Santos 973 were available, the calyx in bud unknown.

MACROCENTRUM LATIFOLIUM Wurdack, sp. nov.

M. cristato (Rich.) Triana et M. fruticoso Gleason affinis, foliis supra modice aspero-strigulosis differt.

Caules quadrangulati nodis exceptis esetulosi; nodi obscure puberuli pilis ca 0.3 mm longis deciduis. Petioli (0.8-)1.5-4 cm longi; lamina (5-)6-9 X (2.5-)3-7 cm ovata apice late acuto basi rotundato-truncata vel cordulata, tenuis et minute serrulata, supra primum modice strigulosa pilis 0.1-0.2(-0.3) mm longis tarde glabrata, subtus glabra, distincte 5-nervata nervis secundariis ca 3-4 mm inter se distantibus. Inflorescentia longe (5-6 cm) pedunculata ad apicem plerumque bifurcata, ramis 0.5-1.5 cm longis secundifloris; flores ca 20-25, 4-meri; pedicelli ad anthesim ca 1.5 mm longi, bracteolis ca 0.2 mm longis lanceatis caducis. Hypanthium (ad torum) 2.6-2.8 mm longum 8-costatum; calycis tubus 0.5 mm longus, lobis vix

evolutis 0.1 mm longis oblatiis, dentibus exterioribus non eminentibus. Petala glabra 6.1-6.5 X 2-2.1 mm elliptico-oblonga apice acuto. Stamina isomorphica glabra; filamenta 2.8-3.2 mm longa; antherarum thecae 3 X 0.25 mm subulatae poro 0.1 mm diam. ventraliter inclinatio; connectivum paullulo (0.1-0.15 mm) prolongatum, cauda dorsali 2.2-2.3 mm longa. Stigma punctiforme; stylus 6.3-6.5 X 0.1 mm glaber; ovarium 3-loculare superum glabrum. Fructus pedicellus ca 2 mm longus; corpus 5 mm longus 8-costatus.

Type Collection: J. J. de Granville 3035 (holotype US 2860496; isotype CAY), collected along "trace de Saül à Carbet Maïs. Colline granitique située à 2 km au Nord de Carbet Mitan. Forêt basse sur les parois rocheuses au sommet (alt. 500 m environ)," French Guiana, 5-7-1979. "Herbe peu ou pas ramifiée. Feuilles brun pourpre. Fleurs blanches."

Both suggested relatives have leaf blades above very sparsely puberulous. Macrocentrum cristatum has usually smaller and 3-nerved leaf blades with acute to obtuse bases (and usually short-pedunculate inflorescences), but barely developed calyx lobes; M. fruticosum (ex descr. and photo) has relatively narrower leaves and well-developed calyx lobes with shortly projecting external teeth (but cordulate-based leaf blades and long-pedunculate inflorescences). The flower size differences are perhaps of no import; the Tafelberg material with 5-merous flowers cited as M. fruticosum (Bull. Torrey Club 75: 540. 1948) shows oblate calyx lobes and seems to be only a variant of M. fasciculatum (DC.) Triana. Despite the small (4-merous) flowers, I have tentatively referred several collections from Paloulouméenpeu, Tumac Humac region, French Guiana, to M. fruticosum (long peduncles, prominent calyx teeth); these collections seem to agree with Hulk 342. Another collection (Daniels & Jonker 751, Kleine Hendriktop, Suriname) has habit, flower size, and sepals as described by Gleason for M. fruticosum, but 5-merous flowers; reexamination of flower-merism in Stahel 457 is needed.

MICONIA OLDEMANII Wurdack, sp. nov.

M. stamineae (Desr.) DC. et M. jucundae (DC.) Triana affinis, foliis valde plinervatis floribus minoribus differt.

Frutex 1.2-2 m; ramuli primum paulo compressi mox teretes sicut foliorum venae primariae subtus inflorescentia hypanthiaque modice resinoso-granulosi demum laeves circum petiolorum bases annulo crasso ca 1 mm elevato armati. Petioli liberi 0.3-1 cm longi; lamina (12-)16-20(-36) X (5-)6-8(-13) cm elliptica vel oblongo-elliptica apice subabrupte 1-3 cm acuminato basi anguste acuta decurrenti, firme membranacea et integra vel obscure distanterque undulato-serrulata, in superficie ubique primum sparse resinoso-granulosa glabrata, manifeste 5-plinervata pari interiore plerumque 2-3(-6) cm supra basim divergenti nervis secundariis plerumque ca 5 mm inter se distantibus nervulis ultimis subtus obscuris areolis ca 0.3-0.5 mm latis. Panicula 9-13 cm longa anguste oblonga (ramis primariis plerumque ca 5 mm

longis) submultiflora; flores 5-meri, bracteolis 0.5-0.7 mm longis subulatis caducis, pedicellis crassis ca 0.5 mm longis. Hypanthium (ad torum) 3.2-3.4 mm longum; calycis tubus 0.9 mm longus, lobis interioribus oblatis vix 0.1-0.2 mm longis, dentibus exterioribus minutis vix (0.1 mm) eminentibus; torus intus sparse glanduloso-setulosus (0.2-0.3 mm). Petala 4-4.4 X 1.6-2 mm obovato-oblonga pruinoso-granulosa. Stamina paulo dimorphica; filamenta 4.5-5 mm vel 4 mm longa glabra; thecae subulatae. Stamina maiora: thecae 4.9 X 0.6-0.7 X 0.6-0.7 mm, poro 0.1 mm diam. ventraliter inclinato; connectivum ad basim ventraliter crasse bilobulatum lobis modice glanduliferis. Stamina minora: thecae 4-4.4 X 0.6-0.7 X 0.6-0.7 mm, poro minuto dorsaliter inclinato; connectivum ventraliter ad basim paulo bilobulatum lobis sparse glanduliferis. Stigma non expansum; stylus 9-11 X 0.5-0.6 mm glaber in ovarii collum ca 0.5 mm immersus; ovarium 3-loculare 1/2 inferum apice sparse glanduloso-setuloso (0.1 mm).

Type Collection: R. A. A. Oldeman B-637 (holotype CAY, 2 sheets), collected in forest on lateritic soil at Chantier Fourgassie, Orapu, French Guiana, 12 Oct. 1966. "Arbuste 1,60 m de haut. Ecorce blancheatre à taches rouges; bois jaune. Fruit mûr noir."

Paratypes (all French Guiana): Montagne de Kaw, Oldeman B-2367 (CAY), de Granville 2921 (CAY, US), de Granville 235 (CAY, P); "Pétales jaune-clair légèrement rabatus. Etamines et styles blancs."; Montagne Maripa, Route de l'Est (RN 2) P. K. 75, de Granville 2886 (CAY, US); Cacao 60 km south of Cayenne, Oldeman 1342 (CAY).

The suggested relatives both have basally nerved or barely (to 0.5 cm) plinerved and shorter leaf blades, hypanthium 4-5 mm long, petals 9-11 mm long, and large anthers 6-8 mm long. More distant relatives in northeastern South America include M. melinonis Naud. (similar but longer anthers with glandular connective base, calyx well lobed at anthesis, style puberulous, essentially basally nerved leaf blades only 5-10 X 2-4 cm), M. amacurensis Wurdack (smaller basally nerved leaf blades, 6-merous flowers, eglandular stamen connectives), and M. lasseri Gleason (rather similar vegetative aspect, but 6-merous flowers, lobed calyx limb, eglandular stamen connectives, glabrous barely inferior ovary). The general vegetative aspect of M. oldemanii is like that of M. prasina (Sw.) DC., which is distinguishable superficially by the non-callose branchlets at the petiole insertions, somewhat laxer leaf veinlet reticulation, and broader inflorescences (as well as very different and smaller flowers). None of the Guiana synonyms of M. prasina correspond to M. oldemanii.

MICONIA TRIMERA Wurdack, sp. nov.

M. lamprophyllae Triana et M. procumbenti (Gleason) Wurdack affinis, floribus trimeris differt.

Frutex plus minusve repens plerumque radicans ca 0.5-0.6 m; ramuli teretes sicut folia inflorescentia hypanthiaque glandulis appressis ca 0.05 mm longis deciduis modice induti. Petioli

(1-)2-6 cm longi; lamina (6-)8-14(-18) X (3-)5-7(-10) cm ovato-elliptica vel elliptica apice paulo gradatimque acuminato basi asymmetricè rotundato-obtusa et interdum auriculata, chartacea et integra vel obscure undulata, distanter appresso-ciliolata alioqui esetulosa, 5-nervata vel paulo (usque 1 cm) plinervata nervis secundariis principalibus ca 4-5 mm inter distantibus nervulis supra obscuris subtus vix elevatis laxè reticulatis (areolis ca 1-1.5 mm latis). Panicula primum terminalis demum lateralis pauciramosa plus minusve deflexa, ramis secundifloris primum ca 1 cm longis demum 3 cm; flores 3-meri sessiles, bracteolis 0.2-0.3 mm longis ovatis subsistentibus. Hypanthium (ad torum) 3 mm longum teres; calycis tubus ca 0.3 mm longus, lobis interioribus vix (0.1-0.2 mm) evolutis oblatis, dentibus exterioribus ca 0.6-0.7 mm eminentibus setula unica 0.1-0.2 mm longa terminatis; torus intus glaber. Petala 3, extus pruinosa, ca 2 X 1 mm, oblonga apice rotundato. Stamina 3, isomorphica glabra; filamenta ca 1.5 mm longa; antherarum thecae ca 2.5 X 0.5 X 0.6 mm anguste oblongae, poro minuto dorsaliter inclinato; connectivum non vel vix (0.1 mm) prolongatum exappendiculatum. Stigma paullulo expansum 0.4-0.5 mm diam.; stylus 6.7 X 0.3-0.4 mm glaber in ovarii collo 0.2-0.3 mm immersus; ovarium 2-3-loculare et ca 1/2 inferum, collo glandulis minutis modice coronato.

Type Collection: J. J. de Granville 2181 (holotype US 2849785; isotype CAY), collected at base of a mountain 2 km north of Degrad Claude, petit Tamouri, French Guiana, 21 March 1974. "Herbe plus ou moins rampante et lignifiée à la base. Fleurs blanches. Forêt broussaillense sur éboulis rocheux."

Paratypes: Suriname: Irwin, Prance, Soderstrom, & Holmgren 54787 (NY, US), lower slopes of Juliana Top north of Lucie River, elev. 300 m; de Granville 1480 (CAY, P, US), Ouaremapann, Tumac Humac, elev. 200 m; Sastre 1467 (CAY, P, US), Crique Petit Koulé-Koulé, Tumac Humac. French Guiana: L. C. Richard s. n. (P), Conana; Oldeman 2902 (CAY) and 3020 (CAY), both from Rivière Arataye (Approuague affluent); de Granville B4023 (CAY) and B4763 (CAY), both from near Plateau de la Douane, Saül; de Granville 2213 (CAY, US), Chemin des Émérillons 5 km from Degrad Claude; Sastre 4406 (P, US), Crique Eulepoussing, Haut Oyapock; de Granville T1168 (CAY, US), west of Trois Sauts, Haut Oyapock; Grenand 263 (CAY), near Zidock. Brazil: Egler & Irwin 46690 (NY, US), near Cachoeira Macacoara, Rio Jari, Amapá, elev. 200 m.

Both suggested relatives have (4-)5-merous flowers, but are similar vegetatively, in the second flowers, and in petals and stamens. Miconia lamprophylla has 3-nerved leaf blades broadly acute at the base, more floriferous inflorescences, and the torus within glandular-setulose, while M. procumbens has both the inflorescence branchlets and hypanthia glandular-setulose and the external calyx teeth not or barely projecting. No other trimerous species of Miconia is known at present. Usually only one of the two branchlets rapidly overtopping the inflorescence of M. trimera develops to any extent. All of the five dissected buds from the type were 3-merous, with 6 stamens; numerous young

fruit among the various collections all had 3 sepals. The Richard paratype had been annotated by Cogniaux, who indicated a novelty but not to be described from incomplete material.

MICONIA SASTREI Wurdack, sp. nov.

M. centrodesmae Naud. affinis, floribus plerumque 5-meris ramis sicut petiolis laminarum subtus venis primariis setosis differt.

Frutex 1-2 m; ramuli teretes sicut laminarum subtus venae primariae petiolique modice setosi pilis (1-)1.5-2 mm longis laevibus tarde deciduis et primum (sicut inflorescentia) sparsiuscule vel modice stellulato-puberuli pilis 0.1-0.15 mm latis caducis. Petioli (1-)2-3 cm longi; lamina (7-)12-21 X (3-)5-10 cm elliptica apice subabrupte per 0.5-1.5 cm acuminato basi late acuta vel rotundato-obtusa, membranacea et subintegra vel distanter crenulata ciliolata, supra sparse vel sparsissime setulosa glabrata, subtus in venulis superficieque glabra, breviter (0.5-1 cm) 5-plinervata nervis secundariis ca 5 mm inter se distantibus nervulis subtus laxe reticulatis (areolis ca 2-3 mm latis). Panicula 5-8 cm longa submultiflora; flores plerumque 5-meri sessiles, bracteolis setuliformibus ca 0.5 mm longis persistentibus. Hypanthium (ad torum) 2 mm longum glabrum vel setis paucis deciduis armatum; calyx hyalinus primum clausus ca 1 mm altus apiculatus demum in lobis usque ad ca 0.5 mm supra torum irregulariter dehiscens, dentibus exterioribus inframarginalibus minutis setulis 1-2 armatis; torus intus dense glanduloso-setulosus. Petala glabra 2.7-2.9 X 1.4-1.5 mm obovato-oblonga. Stamina isomorphica glabra; filamenta 2-2.5 mm longa; antherarum thecae 2.2-2.8 X 0.4-0.5 X 0.35-0.4 mm subulatae, poro 0.1 mm diam. dorsaliter inclinato; connectivum non prolongatum dorsaliter ad basin dente 0.25-0.3 mm longo descendenti hebeti vel bilobulato instructum. Stigma vix expansum 0.4 mm diam.; stylus 5.3-7.3 X 0.3-0.4 mm glaber in ovarii collo 0.4 mm immersus; ovarium 3-loculare 1/4-1/3 inferum, collo ad apicem glanduloso-puberulo subintegro vel lobulato.

Type Collection: J. J. de Granville 849 (holotype CAY; isotypes P, US), collected on forested slope 500 m from Maroni River east of Isle Assadam Tabiki (trail to Monts Atachi Bacca), French Guiana, 12 March 1971. "Arbrisseau velu à tiges vertes. Petiole violet foncé. Fleurs à corolle blanc-jaunâtre. Etamines jaunes."

Paratypes (all French Guiana): Sastre 1365 (P) and Sastre & Moretti 3959a (P), Rivière Inini, Station of Pasteur Institut; de Granville 1550 (CAY, P), Saül-Monts Galbao trail; de Granville 4453 (CAY), Saül-Eau Noire trace.

Miconia centrodesma has predominantly 4-merous flowers and esetulose branchlets, petioles, and primary leaf veins beneath. Other relatives include *M. centrodesmoides* Wurdack (glabrous leaf blades except for the margins, smaller flowers, 4-5-locular ovary), *M. mariae* Wurdack (vegetatively esetulose except for leaf blade cilia, basally nerved leaf blades, smaller stamens), and *M. valeriana* (Standl.) Wurdack (basally nerved leaf blades,

absence of stellulate pubescence). Of the flowers (including buds) examined in M. sastrei, 14 of 16 were 5-merous, the remainder 4-merous; all of the 10 ovaries dissected were 3-celled.

CLIDEMIA SAULENSIS Wurdack, sp. nov.

C. graciliflorae Huber affinis, ramulorum setis longioribus laminarum supra setis longioribus ovarii pilis longioribus differt.

Frutex 0.5-1.7 m; ramuli teretes sicut laminarum venae primariae subtus petiolique dense setosi pilis laevibus paulo reflexis 3-4(-5) mm longis (in laminarum venis primariis paulo brevioribus) et modice resinoso-granulosi. Petioli plerumque 3-7 cm longi; lamina (7-)10-19 X (3-)5-11 cm ovata apice per 2-3 cm gradatim acuminato basi 0.5-1.5 cm cordata, chartacea et ciliato-serrulata, supra sparse subpersisterque appresso-setosa pilis gracilibus 1-2 mm longis, subtus sparsiuscule setulosa pilis ca 1 mm longis gracilibus, (5-)7-nervata nervis secundariis ca 5-7 mm inter se distantibus nervulis subtus dense reticulatis areolis ca 0.2 mm latis. Inflorescentiae in ramulorum nodis superioribus foliosis vel efoliatis oppositae 2-3(-5) cm longae pauciflorae, ramulis sparse glanduloso-setosis (setis 1-2 mm longis); flores 4-meri, pedicellis (ad anthesim) 3-6 mm longis, bracteolis 1-2 mm longis subulatis setuliferis persistentibus ca 0.8-1 mm infra hypanthium insertis. Hypanthium (ad torum) 3.5-4.2 mm longum dense resinoso-granulosum ad anthesim esetosum; calycis tubus 0.1 mm longus, lobis interioribus 0.3 mm longis semicircularibus, dentibus exterioribus 0.7-0.8 mm eminentibus paucisetulosus; torus intus glaber. Petala 2.4-2.5 X 1.2 mm oblonga glabra. Stamina isomorphica glabra; filamenta 2-2.2 mm longa; antherarum thecae 2.5-2.6 X 0.4 X 0.3 mm oblongo-subulatae, poro minuto paulo dorsaliter inclinato; connectivum ca 0.2 mm prolongatum exappendiculatum. Stigma vix expansum ca 0.25 mm diam.; stylus 6.5 X 0.25 mm in ovarii collo ca 0.5 mm immersus ad basim ipsam inconspicue glandulosus alioqui glaber; ovarium (3-)4-loculare omnino inferum (collo excepto), collo 0.6 mm alto sparsiuscule setuloso pilis 0.5-1 mm longis p. p. glanduliferis; fructus sparse glanduloso-setosus.

Type Collection: J. J. de Granville 2787 (holotype US 2855827; isotype CAY), collected on the ORSTOM trail from Saül to Monts Galbao ("P. K. 1,5 environ"), French Guiana, 2 March 1977. "Arbrisseau hirsute, cauliflore, de 1.5 m de haut. Fleurs blanches. Fruits elliptiques bleus. Sous-bois sur le sommet d'une colline."

Paratypes (all French Guiana): de Granville 4220 (CAY), "Sur le circuit Limonade," Saül; de Granville 2004 (CAY, US), "piste de Carbet Maïs," Saül; de Granville 2395 (CAY, US), northeast of Monts Galbao 10 km southwest of Saül.

The suggested relative has branchlet setae only 1.5-2 mm long, leaf blades above esetulose or very sparsely and caducously strigulose (0.1-0.3 mm), and ovary apices with glandular setulae 0.1 mm long. Other relatives include C. silvicola Gleason

(cauline hairs fine and 0.5-1 mm long, leaf blades above very sparsely and caducously strigulose, hypanthium moderately glandular-setulose in bud and flower), and more distantly C. pilosa Don and C. ciliata Don (both with short petioles and larger short-pedicellate flowers), C. microthyrsa R. O. Williams, C. swartzii Griseb., C. vincentiana Urban, and C. umbrosa (Sw.) Cogn. The latter species has similar long cauline hairs but with a deciduous underlayer of barbellate setulae on the young growth, hypanthia moderately fine-setulose at anthesis, anthers broad-pored, and both the torus within and ovary apex with glandular hairs only 0.1 mm long; the Stockholm sheet from the Swartz herbarium has the data "Ins. Sti. Christophori: Fahlberg." Pickled inflorescences of the type collection kindly furnished by de Granville were utilized for the description of C. saulensis.

BELLUCIA SUBROTUNDIFOLIA Wurdack, sp. nov.

In systemate Cogniauxii B. dichotomae Cogn. affinis, foliis proportionaliter latioribus ad apicem obtusis venulis subtus crebris hypanthiis stigmatibusque minoribus differt.

Ramuli robusti primum quadrangulati demum teretes sicut folia novella inflorescentia hypanthiaque primum modice strigulosi (pilis 0.05-0.1 mm longis) ubique mox glabrati; linea interpetiolaris ca 0.5 mm elevata evoluta. Petioli (2-)3-4(-6) cm longi; lamina (12-)15-26 X (11-)13-23 cm suborbicularis vel ovato-suborbicularis apice obtuso vel rotundato basi rotundato-truncata vel paullulo (usque ad 0.5 cm) cordata, subcoriacea et integra, 5(-7)-nervata nervis secundariis plerumque 6-8 mm inter se distantibus nervulis subtus planis crebro reticulatis (areolis ca 0.3-0.4 mm latis). Inflorescentiae ca 5-7(-9)-florae, pedunculo et ramis omnibus ca 1(-2) cm longis, pedicellis 0.5-1 cm longis; flores 5(-6)-meri. Hypanthium (ad torum) 6-7 mm longum; calyx ca 4-5 mm longus in alabastris clausus ad anthesim in lobos usque ad 2-3 mm supra torum irregulariter dehiscens. Petala pulverulenta 13-15 X 9-11.5 mm oblongo-obovata apice rotundato-obtuso. Filamenta 5 mm longa; antherae 6 X 4-4.6 X 3.5 mm ovato-oblonga ventraliter sub apicem minute biporosae. Stigma paulo expansum 1.6 mm diam.; stylus 14 X 1 mm glaber; ovarium 5(-6)-loculare ca 4 mm altum omnino inferum.

Type Collection: B. H. J. de Jong 2 (holotype WAG; isotype US), collected in a small wet savanna at forest edge, Saül, French Guiana, 3° 37' N, 53° 12' W, 11-2-1978. "Small tree 5 m high, 10 cm diam. (other trees up to 8-10 m high, 10-15 cm diam.); leaves coriaceous. Petals on upper side white-rose, on under side rose-white. Anthers yellow. Fruit reddish when unripe, purple when ripe."

Paratypes (topotypical): de Granville B 4629 (CAY, P), 25 Oct. 1972 ("Petit arbre ramiflore, env. 3 m de haut. Ecorce grise, tachetée de blanc, avec de nombreuses fourmis. Bois jaune. Fleurs à corolle rose."); de Granville 2815 (CAY), 6 Mar. 1977 ("Arbre de 5 à 15 mètres de haut. Fleurs à corolle rose, anthères jaunes. Jeunes fruits pourpres").

The suggested relative has leaf blades abruptly short-acuminate at the apex and with length/width ratio 1.5-1.7 (rather than 1-1.2), as well as leaf venule areoles ca 0.5-0.6 mm diam.; the flowers are 7-8-merous, with hypanthium ca 1 cm long and stigma ca 3 mm diam. The bud calyx of B. subrotundifolia is much shorter than typical of the genus and the stigma smaller; however the overall vegetative similarity (especially the fine leaf venule reticulation) as well as the minor tendency to 6-merous flowers indicate that the present generic disposition (rather than Loreya) is preferable. All of the 14 examinable flowers or young fruits in de Jong 2 were 5-merous; in de Granville B 4629, 12 of 19 flowers were 5-merous, the others 6-merous.

LEANDRA PALEACEA Wurdack, sp. nov.

L. rufescenti (DC.) Cogn. affinis, ramulorum pilis appressis compressisque foliorum laminis trinervatis supra ab initio (nervis primariis exceptis) glabris differt.

Frutex 0.5-4 m; ramuli teretes sicut petioli inflorescenti-aeque pilis appressis (in inflorescentiis laxioribus) 1-1.5(-2) mm longis compressis densiuscule strigosi. Petioli 0.5-1(-1.5) cm longi; lamina (4-)7-10 X (1.7-)2.5-4.5 cm elliptica apice breviter gradatimque acuminate basi acuta, chartacea et integra, appresso-ciliolata, supra secus venas primarias densiuscule strigosa alioqui glabra, subtus in superficie sparse strigulosa pilis plerumque 0.5-1(-1.5) mm longis, trinervata nervis secundariis principalibus ca 3 mm inter se distantibus nervulis obscuris areolis ca 1 mm latis. Inflorescentia 2-3(-6) cm longa pauciflora; flores 5(-6)-meri sessiles, bracteolis (inconspicuis?) non visis. Hypanthium (ad torum) ca 2.2 mm longum pilis subappressis plerumque 1-1.5 mm longis paulo compressis densiuscule indutum pilis glanduliferis patentibus ca 1 mm longis sparse vel sparsissime intermixtis; calycis tubus 0.1 mm longus, lobis interioribus 0.6 mm longis ovatis glanduloso-ciliolatis, dentibus exterioribus ca 0.7 mm eminentibus setulosis; torus intus dense glanduloso-setulosus pilis ca 0.5 mm longis. Petala 1-1.5 X 0.4 mm oblonga ciliolata extus apicem versus setulosa et seta 2.2-2.3 mm longa terminata. Stamina isomorphica glabra; filamenta ca 1.5 mm longa; antherarum thecae 2 X 0.3 mm oblongo-subulatae, poro 0.05 mm diam. terminali; connectivum nec prolongatum nec appendiculatum. Stigma paulo expansum 0.4 mm diam.; stylus 7 X 0.25 mm glaber; ovarium 5(-6)-loculare vix (1/10) inferum, apice pilis eglandulosis ca 2.5 mm longis dense coronato.

Type Collection: J. J. de Granville 2061 (holotype US 2849784; isotype CAY), collected in forest on the right bank of Rivière Camopi (Saut Yanivé), French Guiana, 10 March 1974. "Arbrisseau du sous-bois de 0,5 m environ. Jeunes fruits verts."

Paratypes: French Guiana: Oldeman & Sastre 30 (P, US), 42 (CAY), and 57 (P, US), all topotypical; Sastre 4654 (CAY) and Oldeman T-776 (CAY), both from Trois Sauts, Haut Oyapock; Lescure 200 (P, US), from Km 6, Chemin des Emerillons; Lescure 174 (CAY, US), from Degrad Claude, Rivière Tamouri; de Granville 890 (CAY, US), from Saül, Layon du Grand "Circuit Boeuf Mort"; de Granville

1785 (CAY), from "Fleuve Ouaiqui". Brazil, Amapá: Irwin, Pires, & Westra 48131 (US), from Cachoeira Tres Saltos, Rio Oiapoque; Irwin, Pires, & Westra 47784 (US), from Rio Iaué near Oiapoque confluence; Pires, Rodrigues, & Irvine 50685 (US), from Rio Araguari.

The suggested relative has similar petals and ovary, but terete patent cauline hairs, 5-nerved (and usually larger) leaf blades appressed-setulose on the upper surface (at least when young), and somewhat smaller stamens. Most of the collections of L. paleacea had previously been superficially identified by me as possibly a variant of Miconia mutabilis (DC.) Triana; however the Richard type (P), with no exact recent collection match, differs from L. paleacea in the evenly strigose upper leaf surfaces, large floral bracts, eglandular hypanthial hairs, and glabrous obovate and rounded petals 4.5 X 2 mm. The flattened (ca 0.15-0.25 mm wide) cauline hairs of L. paleacea are unlike those of the other species of Sect. Tschudya.

LEANDRA NANAYENSIS Wurdack, sp. nov.

Sect. Tschudya. L. glanduliferae (Triana) Cogn. affinis, caulorum et petiolorum pilis appressis ascendentibus ovarii pilis eglanduliferis differt.

Ramuli teretes sicut laminarum venae primariae subtus et supra petiolique dense strigulosi pilis laevibus ca 1-1.2 mm longis eglandulosis. Petioli 1-2 cm longi; lamina (5-)-7-12 X (1.5-)-3-4.5(-6.5) cm oblongo-elliptica vel ovato-elliptica apice breviter gradatimque acuminato basi acuta vel anguste obtusa, chartacea et integra vel obscure serrulata, supra sparsiuscule laxiusculeque strigulosa pilis ca 0.3-0.5 mm longis, subtus densiuscule setulosa pilis gracilibus laevibus 0.5-0.7 mm longis, breviter (0.3-1 cm) 5-plinervata (pari inframarginali incluso) nervis secundariis 2-3 mm inter se distantibus nervulis obscuris. Inflorescentia 3-5 cm longa pauciflora, ramis dense appresso-setosa pilis rufidulis 1-1.5 mm longis laevibus eglandulosis; bracteolae subulatae 1-1.5 mm longae persistentes; flores 5(-6)-meri sessiles. Hypanthium (ad torum) 2 mm longum dense appressosetosum pilis gracilibus 1-1.3 mm longis p. p. minore glanduliferis; calycis tubus 0.1 mm longus, lobis interioribus 0.2 mm longis ovato-subrotundatis, dentibus exterioribus setulosis paulo (0.1-0.15 mm) eminentibus; torus intus dense glanduloso-setulosus pilis ca 0.1 mm longis. Petala glabra 0.4-0.5 X 0.3 mm oblonga. Stamina isomorphica glabra; filamenta 1.7-1.8 mm longa; antherarum thecae 2.5-2.7 X 0.3 mm subulatae, poro 0.1 mm diam. paulo dorsaliter inclinato; connectivum ad basim vix (0.15 mm) prolongatum dorsaliter inconspicue tuberculatum. Stigma vix expansum 0.25 mm diam.; stylus 6 X 0.2 mm glaber in ovarii collo 0.2-0.3 mm immersus; ovarium 3(-4)-loculare vix (1/10) inferum apicem versus dense strigulosum pilis eglandulosis; semina 0.9-1 X 0.5 mm minute tuberculata.

Type Collection: Manuel Rimachi 3390 (holotype US 2855588), collected in upland forest on trail from caserío de Niña Rumi, Río Nanay, Dto. Iquitos, Maynas, Depto. Loreto, Peru, 2 March

1978. "Rifarillo liana. Fruit green."

Paratypes (all Dto. Iquitos, Maynas, Loreto, Peru; US): McDaniel & Rimachi 20287 ("Liana; infl. red, fr. purple") and Rimachi 2274 ("Liana; fr. green"), both from near Niña Rumi above Puerto Almendro; McDaniel & Rimachi 17705 ("Infl. branches red; fr. green") and 17186 ("1.5 m tall; immature fruit green"), both from Quebrada Aucaya; McDaniel & Rimachi 18922 ("Fls pink; fr. green; anthers white") and Rimachi 1122 ("Fls red; immature fr. green"), both from near Lago Chamchama, Río Nanay.

Leandra glandulifera has similar petals but patent cauline and petiolar hairs, more obviously crenulate-serrulate leaf blades, external calyx teeth projecting 0.3-0.5 mm, and gland-tipped ovarial hairs. Of the other species of Sect. Tschudya with completely glabrous petals, L. edentula Gleason has basally nerved leaves, completely eglandular and coarser hypanthial hairs, and longer petals, while L. polyadena Ule (sometimes with a single petal setula) has setulose branchlets, cordulate leaf blades and longer petioles, larger hypanthia and anthers, and glandular ovary hairs. Of the dissected flowers and fruit in L. nanayensis, 10 were 5-merous and 4 were 6-merous; 15 ovaries were 3-celled and 4 were 4-celled.

OSSAEA MARGINATA (Desr.) Triana subsp. CABRALIENSIS Wurdack, subsp. nov.

A subsp. marginata foliis basaliter nervatis differt.

Type Collection: S. A. Mori, T. S. dos Santos, & C. B. Thompson 10823 (holotype CEPEC 15436; isotype US), collected in mata hygrophila on old highway from Sta. Cruz de Cabralia 4-6 km east of Est. Ecológica do Pau-brasil (ca 17 km west of Porto Seguro), Município de Sta. Cruz de Cabralia, Bahia, Brazil, 18 Oct. 1978. "Arbusto 1,5 m de altura. Perianto esverdeado e anteras amarelas."

Paratypes (all Bahia, Brazil): Mori, dos Santos, & Euponio 11879 (CEPEC, US), topotypical ("Arbusto escandesciente, com tendência a ser cipo"); R. S. Pinheiro 1815 (US), from Km 8 of Sta. Cruz de Cabralia road ("Planta de 3 m de altura, fruto verde"); A. J. Ribeiro, L. A. Mattos Silva, & T. S. dos Santos 015 (CEPEC, US), from near Km 33 of Travessão/Camamu road at entrance to Faz. Brahma road, Município de Camamu ("Arbusto 1,5 m de altura. Frutos imaturos verdes e maduros roxos"); R. M. Harley, Mayo, Storr, dos Santos, & Pinheiro 18342 (K, US), from ca 6 km south-west of Itacaré south of mouth of Rio de Contas, elev. 0-100 m ("Shrub to 3 m with green stems, in coastal evergreen forest understory; leaves slightly coriaceous. Calyx dull, pale green. Petals off-white, reflexed; anthers yellow").

The typical and rather variable subspecies, not yet known from Bahia, has leaf blades distinctly (albeit shortly, 0.3-1 cm) plinerved; also usually the development of simple hairs on the leaves beneath is obvious, the anthers somewhat shorter (1.5-2 mm long), and the development of toral hairs within less. In the Bahia population, simple hairs are nearly or quite absent from the lower leaf surfaces, the anthers 2.6-3 mm long, and

toral hair tufts dense. Apart from the primary leaf venation, the two subspecies are qualitatively similar.

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NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXVI

Harold N. Moldenke

LANTANA LUNDIANA f. *ALBIDA* Mold., f. nov.

Haec forma a forma typica speciei corollis albidis recedit.

This form differs from the typical form of the species in having cream-colored corollas.

The form is based on A. M. Carvalho Pereira & C. M. S. Lira 6 from "em meio ao milharal, estrada de terra próxima a estrada entre Teresópolis e Friburgo", Barracao dos Mendes, Rio de Janeiro, Brazil, collected on November 7, 1978, and deposited in the herbarium of the Departamento de Conservação Ambiental, Rio de Janeiro. The collectors note that the "flores creme, mais de um metro de altura, folhas pedudas, cheiro ativo".

STACHYTARPHETA PATENS Mold., sp. nov.

Fruticulus, ramis ramulisque gracilibus tetragonis minutissime puberulis glabrescentibus, foliis tenuiter chartaceis in sicco nigrescentibus decussato-oppositis, petiolis gracillimis ca. 1 cm. longis minutissime puberulis glabrescentibus, laminis oblongo-subovatis basaliter in petiolum attenuatis apicaliter obtusis vel subacutis margine irregulariter serratis, spicis terminalibus solitariis 10--12 cm. longis multifloris minutissime puberulis glabrescentibus, rhachide leviter exsculpato, calycibus post anthesin patente divergentibus.

Small subshrub, to about 70 cm. tall; branches and branchlets comparatively very slender, rather obscurely tetragonal and sub-margined, very minutely puberulous when young, eventually glabrescent; leaves abundant, long-petiolate, decussate-opposite, nigrescent in drying; petioles very slender, about 1 cm. long, weak, very minutely puberulous, finally glabrescent; leaf-blades thinly chartaceous, oblong-subovate or sublanceolate, 2--4 cm. long, 1.5--2 cm. wide, basally attenuate into the petiole, apically obtuse or subacute, marginally rather irregularly serrate, subglabrate on both surfaces; inflorescence spicate, terminal, solitary, many-flowered, subsessile or extremely short-pedunculate, very minutely puberulent throughout or finally glabrescent; peduncle usually obsolete or less than 1 cm. long; rachis very slender, shallowly excavated beneath the fruit; bracts linear, 1.5 to 4 mm. long, glabrous, usually less than half the length of the fruiting-calyx, widely spreading; calyx 5--6 mm. long, glabrous, obscurely subulate-toothed at the rim, more or less patent-spread-

ing after anthesis; corolla white.

The type of this species was collected by Romero Carnevali (no. 2910) in the woods along the banks of the Paraná River, at Paso de La Patria Vivero Forestal, Dept. San Cosme, Corrientes, Argentina, on March 3, 1972, deposited in the herbarium of the Instituto de Conservação da Natureza, Guanabara, Brazil. The collector notes that the plant was abundant "en las picadas del bosque". The species bears strong resemblance to *S. cayennensis* (L. C. Rich.) Vahl and to *S. maximiliani* var. *glabrata* Schau., but is easily distinguished by its short bracts, widely spreading fruiting-calyxes, etc.

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ADDITIONAL NOTES ON THE GENUS *LAMPAYA*. I

Harold N. Moldenke

LAMPAYA CASTELLANI Mold.

Additional bibliography: Mold., *Phytologia* 45: 282. 1980.

Material of this species has been misidentified and distributed in some herbaria as *L. medicinalis* R. A. Phil., a species to which it is very closely related.

BOLIVIA: Potosí: *Asplund* 3040 (Us), 3172 (S, Us); *M. Cárdenas* 3710 (W--1909477); *Hicken* 22 (N, S); *Troll* 2946 (B, Mu). ARGENTINA: Jujuy: *A. Castellanos* s.n. [Herb. Mus. Argent. Cienc. Nat. 20161] (N--type); *R. E. Fries* 969 (S).

LAMPAYA HIERONYMI Schum. & Mold. ex Mold., Suppl. List Inv.

Names 4, hyponym. Aug. 31, 1941; *Phytologia* 2: 52. Dec. 8, 1941.

Synonymy: *Lampaya hieronymi* Schum. ex Mold., Suppl. List Inv. Names 4, in syn. 1941. *Lampaya schickendantzii* Mold. ex J. Hunziker, *Revist. Invest. Agric.* 6: 177 & 192. 1952. *Lampaya hieronymi* Schum. ex Mold. apud E. J. Salisb., *Ind. Kew. Suppl.* 11: 131. 1953. *Lampaya hieronymi* Mold. apud Troncoso, *Darwiniana* 18: 355, 357, & 358. 1974.

Bibliography: Mold., Suppl. List Inv. Names 4. 1941; Mold., *Phytologia* 2: 52. 1941; Mold., *Alph. List Inv.* Names 27. 1942; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 43 & 94. 1942; H. N. & A. L. Mold., *Pl. Life* 2: 64. 1948; Mold., *Alph. List Cit.* 2: 537 (1948) and 3: 690. 1949; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 104 & 187. 1949; J. H. Hunziker, *Revist. Invest. Agric.* 6: 177, 183, & 192. 1952; *Cabrera*, *Revist. Invest. Agric.* 11: 319 & 349. 1957; Mold., *Résumé* 124, 302, & 458. 1959; Mold., *Fifth Summ.* 1: 197 (1971) and 2: 534 & 883. 1971; Mold., *Phytologia* 28: 458. 1974; Troncoso, *Darwiniana* 18: 355, 357, & 358, fig. 17. 1974.

Illustrations: Troncoso, *Darwiniana* 18: 357, fig. 17. 1974.

This species is based on *Hieronymus* & *Niederlein* 191 from La Rioja, Argentina, and Macbride photographed the type specimen at

Berlin as his type photograph number 17578. Unfortunately, this type specimen is now presumably destroyed.

Schreiter describes the plant as 1 m. tall, the corolla light-violet in color. It has been collected at 4000 m. altitude, flowering in January. The only vernacular name reported for it is "lampaya". Its juice is said to be used by local inhabitants in the treatment of stomach and liver ailments, to wash out open wounds, and in the treatment of gonorrhea.

Hunziker (1952) cites *Hunziker 2189* and *Hunziker & Occhioni 4128* from La Rioja, Argentina. Troncoso (1974) cites *A. Castellanos s.n.* [Herb. Mus. Argent. Cienc. Nat. 30/602] and *Herb. M. Lillo 32407* from Catamarca, pointing out that more field work is needed to ascertain the validity of this taxon. Material has been misidentified and distributed in some herbaria as *L. medicinalis* R. A. Phil., a species to which it is obviously very closely related.

Citations: ARGENTINA: Catamarca: *A. Castellanos s.n.* [Herb. Mus. Argent. Cienc. Nat. 30/602] (N); *Schreiter 6068* [Herb. Osten 22985] (F--photo, N, N--photo, Sg--photo, Z--photo). La Rioja: *Hieronymus & Niederlein 191* [Macbride photos 17578] (B--type, F--photo of type, Kr--photo of type, N--photo of type, W--photo of type, Z--photo of type).

LAMPAYA MEDICINALIS R. A. Phil., Anal. Mus. Nac. Chile Bot. 1: 58, pl. 2, fig. 5. 1891.

Synonymy: *Lampaya officinalis* Phil. ex Murillo, Pl. Médic. Chili 163, nom. provis. 1889. *Lampaya officinalis* Phil. apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 237. 1903. *Lampaya aratae* Molino in Dominguez, Invest. Fitoquim. 196. 1928.

Bibliography: F. Phil., Verh. Deutsch. Wiss. Ver. Santiago 1: 160. 1886; Murillo, Pl. Médic. Chili 163. 1889; R. A. Phil., Anal. Mus. Nac. Chile Bot. 1: [Cat. Praev. Pl. Itin. Tarap.] 58, pl. 2, fig. 5. 1891; R. A. Phil., Verz. Hocheb. Prov. Antofag. Tarap. Pfl. pl. 2. 1891; R. E. Fries, Nov. Act. Reg. Soc. Sci. Upsal. 4 (1): [Nord Argent.] 110. 1905; Reiche & Phil. in Reiche, Estud. Crit. Fl. Chil. 5: 304. 1910; M. Kunz, Anatom. Untersuch. Verb. 35 & 36. 1911; Dominguez, Invest. Fitoquim. 196. 1928; Baeza, Nomb. Vulg. Pl. Silv., ed. 2, 123. 1930; Stapf, Ind. Lond. 4: 37. 1930; Junell, Symb. Bot. Upsal. 1 (4): 34 & 36, fig. 66. 1934; Mold., Suppl. List Inv. Names 4. 1941; Mold., Alph. List Inv. Names 27. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 42 & 94. 1942; Mold., Lilloa 10: 374. 1944; Mold., Phytologia 2: 104. 1944; Mold., Alph. List Cit. 3: 690 & 813. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 101 & 187. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 44--45. 1951; Mold., Résumé 121, 302, & 458. 1959; Muñoz Pizarro, Sin. Fl. Chil. 199. 1959; Muñoz Pizarro, Espec. Pl. Descr. Philip. 110. 1960; Mold., Phytologia 15: 466. 1968; Heusser, Pollen Spores Chile 61. 1971; Mold., Fifth Summ. 1: 192 (1971) and 2: 534 & 883. 1971; Mold., Phytologia 28: 458. 1973; Montes, Wilkomirsky, & Ubilla, Pl. Med. 25: 192. 1974; Troncoso, Darwiniana 18: 355, 356, & 358, fig. 16. 1974; Mold., Phytologia 45: 282. 1980.

Illustrations: R. A. Phil., Anal. Mus. Nac. Chile Bot. 1: [Cat. Praev. Pl. Itin. Tarap.] pl. 2, fig. 5. 1891; R. A. Phil., Verz. Hocheb. Prov. Antofago Tarap. Pfl. pl. 2. 1891; Junell, Symb. Bot. Upsal. 1 (4): fig. 66. 1934; Troncoso, Darwiniana 18: 356, fig. 16. 1974.

Although a specific ("*officinalis*") epithet was proposed for this species earlier than the one here adopted, it is invalidated under the present Code of Botanical Nomenclature, having been published before the genus itself had been validly published. *Lampaya aratae*, a later name, is a nom. provis. published without validating description.

R. A. Philippi's original (1891) description is: "Frutex 50--60 cm. altus, saepe diametri 2--3 m., ramissimus, rami cortice rufa vestiti, ramuli breves. Folia opposita, conferta, crassa, coriacea, brevissime petiolata, ovata, integerrima, ad summum 13 mm. longa, 7 mm. lata, glaberrima, resinoso-punctulata. Flores pauci, c. 10 in apice ramulorum sessiles, bractea squamuliformi, ciliolata fulti, quae cupulam simulat. Calyx 5 1/2 mm. longus, subcylindricus, quinquecostatus s. plicatus, fructifer parum ampliatus, fructui arcte adhaerens, ore constricto. Corolla 9 mm. longa, glaberrima, pallide violacea. Habitat in tractu de Machuca ad Pica, ab incolis Lampaya vocatur, et uti valde medicinalis laudatur." The title of the article in which this description occurs is "Catalogus praevious plantarum in itinere ad Tarapaca a Friderico Philippi lectarum. Elaboravit R. A. Philippi", so it is obvious that the type was collected by F. Philippi, not by R. A. Philippi, but R. A. Philippi is the author of the binomial. The province of Chile investigated on this trip is Tarapacá, north of Antofagasta, toward the Peruvian boundary. Of Pica, the type locality, Philippi, in the introduction to his work (p. vi), says: "Del punto llamada Huasco (cerca de 3900 m. sobre el mar) los viajeros tomaron la direcccion al oeste para bajar a Pica, oásis situada en la Pampa del Tamarugal a la altura de 1367 m.... La pampa o desierto del Tamarugal se estiende entre la cordillera de la costa al oeste hasta el pié de la alta meseta al este con un anchura de 45 quilom. mas o ménos, i entre el rio Loa al S. i el rio Camarones al N. por casi tres grados i medio. Esta des poblado a escepcion de unas pequeñas oásis."

Reiche and Philippi (1910) describe the species as "Arbustito mui ramoso, lampiño. Las ramitas cortas, con la corteza roja. Hojas tupidas, coriáceas, aovadas, mui cortamente pecioladas, finísimamente resinoso-puncteadas: de 8 12 mm. de largo. Flores ca. 10, sésiles, hácia el extremo de las ramas. Brácteas cortas, pestañosas. Cáliz de 5 mm. de largo, despues un poco mas grande i con el limbo encojido. Corola pelada, de un violáceo pálido, de 1 cm. de largo. Drupa ovóide, de 4--4,5 mm. de largo. Huesos de la drupa de 3 mm. Tallos 0,1--0,3 mm. Tallos 0,1--0,3 m. En las cordilleras altas (3,500 4,000 m.) de la provincia de Tarapacá, al sureste de Pica; todavia en territorio chileno? Planta mui medicinal."

Macbride has photographed an isotype of this species in the Berlin herbarium as his photograph number 17579. Recent collectors

have encountered this plant at altitudes of 2800--3750 meters. "Lampaya" is the only vernacular name thus far recorded for it.

Montes and his associates (1974) report that the leaves are used to treat "Maladies des voies urinaires et du foie". Troncoso (1974) quotes Murillo (1889) as saying that "Les habitants lui donnent le nom de lampaya o lampayo et le regardent comme un remède universel, l'employant fréquemment et avec une confiance très grande. Selon M. Belisario Java, de Pica, l'infusion d'une once de lampayo dans un litre d'eau est un excellent sudorifique pour les refroidissements, les rhumatismes et les siphilis." She continues: "En el N. argentino, especialmente en el Quebrada de Humahuaca, se usa *L. medicinalis* Ph. como materia colorante. (De la tesis inéd. del Ing. M. Uro, 1927)."

Junell (1934) says that "Der Fruchtknotenbau wie bei den vorhergehenden Gattungen [*Nashia*, *Lantana*, *Lippia*, etc.] wie aus Fig. 66 ersichtlich, setzt sich von den beiden Plazentagefässbündeln je ein kräftiger Zweig nach oben in den Fruchtknoten fort. Die Integumenttapetum ist schwach ausgebildet. Der Embryosack ist gleichmässig dick und oben kaum erweitert. An einem Präparat habe ich ein mikropylares Haustorium mit etwa sechs, in einem Kreis nebeneinander liegenden Zellen beobachtet. Ich habe keine Gelegenheit gehabt, Früchte zu untersuchen. Diese zerfallen in zwei Steine und sind vermutlich steinfruchtartig."

Heusser (1971) cites *L. medicinalis* from Tarapacá and Antofagasta, Chile. Troncoso (1974) cites *F. Philippi* s.n. from "Colana" and Perry 6985 from Antofagasta, Chile, and A. Castellanos s.n. from Jujuy, Argentina, as well as Martin 378 from an unspecified locality.

The *Cárdenas* 3710 and *Troll* 2946, distributed as *L. medicinalis*, seem actually to represent *L. castellani* Mold., while *Asplund* 12352 is *Acantholippia deserticola* (R. A. Phil.) Mold.

Citations: CHILE: Antofagasta: *Martcorena*, *Matthei*, & *Quezada* 404 (Z); *Pfister* 8387 (S); A. *Pinto* s.n. [Est. San Pedro, 28-IX-1948] (Ac). Tarapacá: R. A. *Philippi* 1283 (W--1323387), s.n. [Macbride photos 17579; Herb. Mus. Nac. Hist. Nat. Chile 54881] (Kr--photo of isotype, N--photo of type, N--photo of isotype, N--photo of isotype, W--photo of isotype, Z--photo of isotype).

NOTES ON THE GENUS *PERONEMA*

Harold N. Moldenke

It had been my intention to publish a formal detailed monograph of this genus, along with all other genera on this and related segregated families, but this plan now appears to be infeasible because of lack of time. It has seemed worthwhile, however, to place on record herewith the miscellaneous notes, chiefly bibliographic, assembled by my wife and myself over the past fifty

years. This is the 49th genus so treated. Full explanation of the herbarium acronyms employed herein, as in all others in this large series of papers in this journal since 1933, will be found in my "Fifth Summary of the *Verbenaceae*....." (1971), pages 795--801.

PERONEMA Jack, Malay. Misc., imp. 1, 1: 46--47. 1820.

Synonymy: *Peronema* Jacq. apud Schnitzl., Icon. Fam. Nat. Veg. 2: 137 Verbenac. [3], sphalm. 1856. *Paronema* Chowdhury, Journ. Indian Bot. Soc. 43: 335, sphalm. 1964; Mold., Résumé Suppl. 15: 21, in syn. 1967.

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Mal. Fam. 73. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 139, 140, 143, 144, 146, 162, & 192. 1949; Metcalfe & Chalk, Anat. Dicot. 1035--1038 & 1041. 1950; Angely, Cat. Estat. Gen. Bot. Fan. 17: 5. 1956; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 433. 1958; Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR 3: 216. 1958; Mold., Résumé 178, 180, 188--190, 193, 220, 330, 413, & 464. 1959; Embarger in Chadeaud & Embarger, Traité Bot. 2: 828. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 473. 1960; Dalla Torre & Harms, Gen. Siphonog., imp. 3, 433. 1963; Chowdhury, Journ. Indian Bot. Soc. 43: 335, 336, & 342, pl. 1, fig. 3. 1964; J. Muller in Cranwell, Ancient Pacif. Floras 39. 1964; Backer & Bakht., Fl. Java 2: 594 & 612. 1965; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 195. 1965; Chopra, Badhwar, & Ghosh, Poison. Pl. India 2: 694. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 853. 1966; Mitra, Elem. Syst. Bot. Angiosp., ed. 2 abrdg., 141. 1967; Mold., Résumé Suppl. 15: 21. 1967; Kundu & De, Bull. Bot. Surv. India 10: 406. 1968; Uphof, Dict. Econ. Pl., ed. 2, 397 & 541. 1968; Corner & Watanabe, Illustr. Guide Trop. Pl. 763. 1969; J. Hutchins., Evol. Phylog. Flow. Pl. 469 & 701. 1969; Keng, Ord. Fam. Malay. Seed Pl. 278. 1969; Rouleau, Guide Ind. Kew. 142 & 352. 1970; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 875. 1973; Mold., Fifth Summ. 1: 297, 305, 325, & 366 (1971) and 2: 593, 594, 763, & 897. 1971; Mukhopadhyay, Pollen Morph. Verb. [thesis]. 1971; Mold., Phytologia 23: 424, 429, & 500. 1972; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 678. 1973; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 12 (2): 95 (1973) and 13: 178 & 328. 1976; Mold., Phytologia 34: 265, 270, & 508. 1976; Jack, Malay. Misc., imp. 2, 1: [i] & 46--47. 1977; Jack, Descr. Malay. Pl., imp. 2, [i] & 2: 46--47. 1977; Mound & Halsey, Whitefly World 160, 305, & 312. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40 & 47. 1978; Mold., Phytologia 44: 221 & 510. 1979.

It is worth noting here that the date of the original publication of this genus is given as "1822" by most authors, although the erroneous dates, "1820" and "1832", also appear in the literature on the genus. Jack's original description is: "*Didynamia* Angiospermia. N.O. *Verberaceae*. Br. Calyx 5-partitus. Corolla tubo brevi, limbo irregulari 5-lobato, laciniis secundis. Stamina duo, exserta; rudimenta duorum sterilium. Stigma refractum. Fructus siccus, 4-partibilis, 4-spermus. Arbor, foliis pinnatis petiolo alato, panicula terminali, opposita corymbosa.....The genus is related to *Vitex* but is abundantly distinct therefrom."

Bentham (1876) amplified this description to: "Calyx campanulatus, breviter 5-fidus, fructifer immutatus. Corolla tubus brevis; limbus sub-2-labiatus, 5-fidus, lobis parum inaequalibus, 2 posticis exterioribus, antico caeteris paullo longiore, concavo. Stamina 2, antica, fauci affixa, subexserta; antherae parvae, late ovatae, loculis subparallelis distinctis. Ovarium 4-loculare, loculis 1-ovulatis; stylus apice incurvus, acutus, integer; ovula sub apice lateraliter affixa. Capsula parva, subglobosa, calyce longior, 4-valvis; valvae a basi deciduae, crustaceae cum membrana externa villosula, placentae in columnam centram 4-alatam coher-

entes liberantes v. demum inter se solutas auferentes. Semina sub apice affixa, pendula, exalbuminosa. - Arbor procera, ramulis foliis inflorescentibusque tomento minuto subcanescentibus. Folia opposita (2-pedalia) imparipinnata, foliolis suboppositis conjugis lanceolatis integerrimis, rhachi apice saepe anguste alata. Cymae laxae, in paniculas 3-chotomas floribundas in axillis superioribus pedunculatas dispositae. Flores minimi. Bracteae minutae, setaceae."

Clarke (1885) describes the genus as "A lofty tree; branchlets grey-tomentose. Leaves opposite, unequally pinnate; leaflets several pair, entire. Panicles in the upper axils large, compound; bracts small, flowers very small. Calyx shortly 5-fid, not accrescent. Corolla tube cylindric; limb 2-lipped, 5-lobed. Stamens 2; anthers subexserted, ovate; cells parallel, subseparate. Ovary 4-celled, 4-ovuled; style filiform, subentire. Capsule small, globose, longer than the calyx, 4-valved; valves quarter-spheres, margins inflexed holding the seeds. Seeds pendulous."

Miquel (1856) describe it as "A tree, medium or rather small; branches grey-tomentose. Leaves imparipinnate; leaflets 7 to 9 pairs. Inflorescence of large corymbose panicles terminal of very numerous, small white flowers. Calyx campanulate, 5-lobed. Corolla short, 2-lipped, 5-lobed, midlobe of flower-lip largest. Stamens 2, exsert. Ovary 4-celled; cells 1-ovuled. Capsule small, globose, of 4 crustaceous valves separating from base. Seeds small. Species 1, Malay Peninsula, Borneo, Sumatra, Java."

Briquet (1894) characterizes the genus as follows: "Kelch glockig, kurz 5spaltig, zur Zeit der Reife unverändert. Blkr. mit kurzer Röhre; Saum schwach 2lappig, 5spaltig, mit schwach ungleichen Lappen, die 2 hinteren nach aussen gelegen, der vorderer grösser als die übrigen, concav. Stb. 2, die vorderen im Blumenkronsc-lunde inseriert, \pm exsert; A. klein, breit eiförmig, mit \pm parallelen Thecae. Frkn. 4fächerig, mit je 1 fast gipfelständigen, hangenden, Sa. enthaltenden Fächern; Gr. am Gipfel gebogen, spitz, ungeteilt. Kapsel klein, halbkugelig, länger als der Kelch, 4klappig; Klappen von der Basis abfällig, etwas krustig, die 4 zu einer 4flügeligen axilen Säule verwachsenen Placenten frei machend oder losreissend. S. fast gipfelständig. - Hoher Baum, mit dünnen Filze auf Zweigen und B. bedeckt. B. gegenständig, unpaarig-gefiedert, mit fast gegenständigen, zahlreichen, lanzettlichen, ganzrandigen B. Cymes locker in axillären, reichblütigen Rispen. Bl. und Bracteen sehr klein."

Lam (1919) also describes the genus in practically identical manner: "Small trees; branchlets, inflorescences and petioles minutely grey-tomentose; leaves large, opposite, imparipinnately composed; inflorescences terminal, large, composed of cymes; bracts subulate; flowers small; calyx 5-toothed, somewhat 2-lipped, unaltered in fruit; corolla with short tube; limb oblique, 2-lipped, 5-lobed, upper lip with 2 small, lower lip with 3 larger lobes, the middle one larger; stamens 2, exserted, inserted in the ventral and basal part of the corolla-tube; style slender, with subulate stigma, sometimes bifid; ovary 4-celled, cells 1-ovuled; fruit a 4-valvate capsule; placenta central, winged, seeds pendulous, without

albumen. Distribution: Malay Peninsula! and western part of Archipelago!"

Junell (1934) notes that "Bei *Peronema* zerfällt auch tatsächlich die Frucht ziemlich leicht". He places the genus in Subtribe *Viticeae* (instead of *Caryopteridoideae*) with *Hymenopyramis* Wall., saying "Die Einreihung dieser beiden Gattungen in *Viticeae* begründe ich hauptsächlich mit der Übereinstimmung hinsichtlich des Fruchtknotenbaus. Die Plazenten sind jedoch im obersten Teil des Fruchtknotens nicht verwachsen. Möglicherweise wären die beiden Gattungen, und zwar vorsugsweise *Peronema*, mit Rücksicht auf den Fruchtknotenbau besser in *Callicarpeae* unterzubringen. Der Umstand, dass die Fruchtwand trocken ist, bildet meines Erachtens kein direktes Hindernis für die Platzierung der Gattungen in einer dieser beiden Subtribus, insbesondere wenn man berücksichtigt, dass die Fruchtwand immerhin noch Steinzellen enthält. -- *Peronema* besitzt auch Ähnlichkeit mit einigen Gattungen, die den Übergang zwischen *Clerodendreae* und *Ajugeae* bilden."

Backer and Bakhuizen (1965) have lately amplified the generic description as follows: "Flowers small, in an erect, large, densely short-hairy, terminal panicle; bracts small; calyx 5-fid almost halfway down, slightly enlarged under the fruit; corolla bilabiate; tube short, widened in the upper half; upper lip short, bifid, lower one longer, 3-fid, median lobe by far the largest; stamens 2 (anterior ones), inserted at the base of the widened part of the corolla-tube, far exserted between the posterior corolla-segments, decurved; ovary 4-celled; cells 1-ovuled; style far exserted, its tip subulate; drupe small, globose, dry, 4-coccous. Branches densely pubescent; leaves opposite, imparipinnate; rachis winged; leaflets opposite or alternate, 3--11-jugate plus terminal leaflet, sessile or shortly stalked, entire or occasionally serrate, accrescent toward the apex of the leaf; lateral nerves numerous, parallel. Tree."

It is perhaps worthy of note here that the Endlicher (1838) reference cited in the bibliography (above) is often cited as "1836--1856", the titlepage date, but the pages involved with the genus under discussion were actually issued in 1838. Similarly, the Schnitzlein (1856) reference is often cited by the titlepage date of "1843--1870", but, again, the page involved here was actually issued in 1856. Moore's paper (1925) is sometimes cited as authored by "Rendle" or "S. Moore in Rendle", but according to the table of contents Moore was the sole author. The plate sometimes cited to Griffith's *Notul. Pl. Asiat.* actually was issued in his *Icon. Pl. Asiat.* of the same year (1854).

Peronema canescens Jack is the type and only known species in the genus.

PERONEMA CANESCENS Jack, Malay. Misc., imp. 1, 1: 46--47. 1820.

Synonymy: *Peronema heterophyllum* Miq., Fl. Ind. Bat. Suppl. 570--571. 1860. *Peronema canescens* Vahl ex Mold., Résumé 330, in syn. 1959. *Peronema canescens* Jacq. ex Uphof, Dict. Econ. Pl., ed. 2, 397, sphalm. 1968

Bibliography: see under the genus as a whole.

Illustrations: Wight, Icon. Pl. Ind. Orient. 4 (3): pl. 1460. 1849; W. Griff., Icon. Pl. Asiat. 4: pl. 448, fig. 3. 1854; Francé, *Leben Pflanze* 6: 513. 1913; Koord. & Valet., *Atlas Baum-art.* Jav. pl. 280 & 281. 1914; Junell, *Symb. Bot. Upsal.* 4: 95, fig. 148. 1934; Chowdhury, *Journ. Indian Bot. Soc.* 43: opp. 342, fig. 3. 1964; Corner & Watanabe, *Illustr. Guide Trop. Pl.* 763. 1969.

Jack's original (1820) description of this species is as follows: "A large tree, native of Sumatra. Trunk straight, but little branched. Leaves opposite, ovate, nearly two feet long, with 7--9 pair of leaflets which are alternate or subopposite, lanceolate, attenuated to both ends, acute, somewhat recurved, entire, smooth above, canescent beneath, veins reticulate on the under surface; 8--9 inches long. Petioles winged, finely and delicately tomentose, wings decurrent from the insertion of the leaflets. Stipules none. The branches are crowned by a vast terminal oppositely corymbose panicle, of which the ultimate divisions are dichotomous with a flower in the bifurcations; the whole is finely tomentose and hoary. Bracts small, acute. Flowers inconspicuous, whitish. Calyx five-parted, segments acute, erect. Corolla not much longer than the calyx, limb expanding, irregular, five-lobed, segments secund, the two upper ones diverging, the lowermost considerably longer than the rest. Stamina two, reflexed backwards between the upper segments of the corolla; filaments subulate, thickened towards the base; anthers long. Rudiments of two abortive stamina. Ovary four celled, ovule erect. Style rather longer than the stamina. Stigma simple, refracted. Fruit seated on the calyx, villous, dry, separating into four portions, each of which contains a single seed. Obs. This is a valuable timber tree, the wood being hard and tough, well suited for carriage shafts, which require to combine strength and elasticity with lightness. When long buried in the earth, it is said to become petrified. The genus is related to *Vitex*, but is abundantly distinct therefrom."

More recent writers and collectors describe the plant as a shrub or small to large tree, 12--30 m. tall, the trunk slender and strict, the bole to 9 m. high, 38--70 cm. in diameter at breast height, the wood durable, tough, darkening when cut, the bark white or gray to pale-brown or "biscuit-color", rather smooth, bitter, very strongly laminated or peeling, longitudinally fissured, the sap not milky, the branchlets densely grayish- or brownish-tomentose or short-hairy, the leaves imparipinnately compound, decussate-opposite, 15--60 cm. long, 10--15 cm. wide, rich-purple when young, hoary-white beneath, the rachis often winged throughout the space between the leaflets, decurrent or "not truly decurrent", the petioles 3--18 cm. long, flat above, conspicuously alate, lightly or densely grayish- or brownish-tomentose, the leaflets 7--9 alternate or subopposite to opposite pairs, sessile, herbaceous or rather thin-chartaceous, lanceolate or oblong-lanceolate, apically acutely acuminate to attenuate or caudate, basally acute to attenuate or cuneate, serrate (upper) or entire (lower), the smallest ones basal, 2.5--15 cm. long, 1--3.5 cm. wide, and acute at both ends, the upper larger ones 10--35 cm. long and 3.5--7.5 cm. wide,

densely gray- or whitish-pubescent or tomentose and reticulate-venose beneath, often concave, glabrous above, often subrecurved, the secondary venation comprising 20--30 pairs, the inflorescence terminal or thyrsoid, large, resembling that of *Tectona grandis* L. f., 25--35 cm. long, 18--40 cm. wide, densely grayish- or brownish-puberulent or lightly pubescent-tomentose throughout, with a pale-green or brown aspect when fresh, made up of opposite trichotomous cymes in secondary corymbs, the axes light-yellowish, the first branches decussate-opposite; bractlets 1 mm. long, narrow, apically acute, pubescent; flowers minute, inconspicuous, white or greenish-white, 2--3 mm. long, not fragrant; calyx campanulate, green or greenish, about 1 mm. long, densely glandular-hairy, deeply toothed or 5-parted to almost the middle, unchanged in fruit, the lobes patulous or deltoid, reflexed in fruit; corolla 3--4 mm. long, whitish-glandular-pubescent, the tube subinfundibular, somewhat longer than the calyx, often glabrate, the limb oblique, 2-lipped, the 4 upper lobes subequaling the calyx-lobes, the 5th anterior lobe twice as long, erect, 2-lobulate, quite petaloid; fertile stamens 2 (the lower pair), exserted, recurved, the upper 2 reduced to rudimentary filaments; lower filaments stout, subulate, pale- or yellow-green, introflexed in aestivation; anthers large, reniform-oblong, sordid-yellow, 2-locular, attached in the sinus between the thecae, longitudinally dehiscent; style filiform, pale-green, basally pilose; stigma subsimple, subulate, curved; ovary cordate-rotund, apically densely pilose, 2-locular; ovules enclosed in partial cells from a recurved placenta, pendulous; capsule about 3 mm. long and 2 mm. wide, hirsute.

The corollas are said to have been "white" on *Balgooy* 2483, "whitish" on *Put* 251, and "yellow-green, lip white" on *Maxwell* 75-905. On *Jacobs XI-K-25* they are described as "2 upper petals green with a whitish base enveloping the base of the stamens, 3 lower petals white".

Griffith (1854) notes that "As the ovarium increases the calyx is forced to spread out, it is now pubescent, in all the exposed part marked by 4 lines converging to the cicatrix of the style and simulating well a Boragineous fruit. The placentas have become fleshy, and the proper cells of the ovula, quite complete (except adhesion). This is evidently the *Peronema canescens* of Jack, who describes the ovary as 4-celled, and the ovules as erect, in which case a greater degree of affinity with *Tectona* would be manifested; he also describes the wing of the petiole as decurrent, i.e. derived from the leaflets. The inflorescence and aspect of the young fruit, is exactly that of *Tectona*, so is the appearance of the under surface of the leaves, although these perhaps are not siliceous. It osculates directly between the *Vitex* section and *Tectona* do." He says that the calyx is "demum immutatis", but this is an obvious error for "immutatis", just as his "osculates" is obviously an error for "oscillates".

Junell (1934) affirms that "Im oberen Teil des Fruchtknotens sind die Plazenten frei. Unterhalb der Samenanlagenansatzpunkte verwachsen die Plazenten. Die Fruchtblattränder bleiben jedoch

frei. Die Fruchtblattmitte ist nicht verdickt. Die Samenanlagen sind oberhalb der Mitte inseriert. Der oberer Teil des Embryosacks ist etwas erweitert. Die Fruchtknotenwand ist sehr dick, und im Fruchtstadium sind die inneren Schichten stark verhärtet; es ist daher schwierig, Mikrotomschnitte durch die Frucht zu erhalten. Die kugelige Frucht zerfällt zuerst an der Grenze zwischen den Fruchtblättern, und die Hälften teilen sich dann an der Medianlinie des Gynäceums entlang."

Recent collectors have found this species growing in open country, swampy river edges, evergreen forests and jungles on foothills, and damp ground along roadsides, at altitudes of 50--900 m., flowering in February, April, May, August, and September, in fruit in May, August, and October. Corner and Watanabe (1969) report the species as medicinal and assert that it is also used as a hedge plant. In fact, the *Stone & Anderson 8733*, cited below from Johore, may well have come from a cultivated plant. Stone reports it common in Pahang, while Balgooy reports it common in more or less open places in forests. *Burger 1048 & 2207* represent seedlings, the former very young ones. Jacobs refers to it as a "tree enveloped in a cloud of flowers" when in full anthesis, but most authors refer to the flowers as quite inconspicuous per se. The bark is said to be employed medicinally in the treatment of fevers. Corbett (1936) affirms that *Peronema canescens*, as well as *Cinnamomum* sp., serve as host to the whitefly, *Dialeuropora decempuncta* (Quaint. & Bak.) Takahashi in Sri Lanka.

Uphof (1968) affirms that the wood of this "Malayan Archipelago" tree resembles that of "djati" [*Tectona grandis* L. f.] though lighter in color and is "of much demand in Sumatra for the construction of houses and bridges; a decoction of the leaves is used as a mouthwash for toothache". Backer and Bakhuijzen (1965) assert that the Javan population as "Possibly introduced from Sumatra, as may be concluded from the popular names 'djati sabrang' and 'ki sabrang' (i.e., tree of beyond the sea)."

Heyne (1917) says of the species: "Boom, tot 22 M. hoog en 60 cm. dik, in 1892 volgens K. & V.....op Java wildgroeënd alleen aangetroffen nabij Menes in West-Bantam, thans in Bantam en het westelijk deel van Batavia reeds tamelijk algemeen en zich derhalve vrij snel oostwaarts verbreidende. In Midden-Java is hij herhaaldelijk aangeplant gevonden, zoowel voor pagers als om het hout. Op Sumatra is hij in de benedenlanden algemeen. Het hout wordt daar volgens K. & V. geroemd voor huisbouw en bruggen; het is licht en veerkrachtig en dient in Palembang voor den bouw van ossenkarren en dergelijk klein werk, in de Lampongs bij den huisbouw, doch liefst onder dak. Stakman.....noemt het een zeer gewilde houtsoort en vermeldt de ook in Palembang bekende eigenaardigheid, dat het in stroomend water in den tijd van 6 jaar versteent. In Bulletin No. 14 Kol. Museum, bl. 60, wordt gezegd, dat loeroeshout door zijn laag s.g. bijzonder in aanmerking komt voor kapconstructies: voor andere doeleinden zou het minder bruikbaar zijn wegens een sterke neiging om te scheuren. Ook zou het worden aangetast door witte mieren en in den grond snel ver-

rotten. Een aktreksel van de bladeren wordt in Z. O. Borneo ge-
bezigd als mindspoeling tegen tandpijn; in Palembang kent men aan
een afkooksel koortswerende eigenschappen toe."

Vernacular names reported for this plant are "djati sabrang",
"false elder", "ki sabrang", "kisabrang", "loeroesi", "mēlajoe",
"noengkē", "sekai", "sekay", "soehai", "soekai temor hiram",
"soengkai", "soengkaii", "soengkay", "soengké", "soèngké",
"soengkei", "soengke-melajoe", "soèngkie", "song krae longha",
"soongkai", "sungkai", and "tjisabrang".

Wallich, Numer. List 303, no. 9057, is sometimes cited as
Peronema, but actually is *Panax pinnatum* Lam. (Araliaceae), but
no. 9075, on the same page, is the number intended. Of it Wal-
lich (1849) says "Origin uncertain".

Miquel (1856) records the species from Sumatra; Griffith (1854)
from Malacca. Clarke (1885) records it from Malacca, Sumatra,
Java, and Borneo, but cites only Griffith 6025 from Malacca.
King and Gamble report it from Borneo. Ridley (1923) cites un-
numbered collections by Foxworthy, Griffith, and Scortechini from
Singapore, Pahang, Malacca, Selangor, Perak, and Penang in Malaya.
Lam (1919) cites Ridley 3993 from Singapore, *Junghuhn s.n.* from
Java, and Forbes 2655 and Korthals 1360 from Sumatra.

Japing and Seng (1936) aver that *Peronema canescens* makes moder-
ate demand upon the soil, but does not thrive on physically bad
soils. The increment is rather slow, even on good soils. The wood
has moderate value. We advise against planting of this species on
a large scale."

King and Gamble (1908) cite the following collections: Curtis
2427 from Penang, Ridley 2247 from Pahang, Scortechini 1160 from
Perak, Griffith 6015 from Malacca, Ridley 3993 from Singapore,
Forbes 2655 and Teijsmann s.n. from Sumatra, and Motley 870 from
Borneo.

Material of *Peronema canescens* has been misidentified and dis-
tributed in some herbaria as *Vitex* sp. On the other hand, the
W. Y. Chun 1090 [Herb. Univ. Nanking 6469], distributed as *Pero-*
nema canescens, actually is *Sphenodesme pentandra* Jack in the
Symphoremaceae. Blume s.n. in the Leiden herbarium was annotated
by someone as "Nov. gen. Melicarum".

Citations: THAILAND: Maxwell 75-905 (Ac); Put 251 [Herb. Roy.
Forest. Dept. 10549] (Z). MALAYA: Johore: Ngadiman 36890 (Bz--
22016); Stone & Anderson 8733 (Kl--10690). Kedah: Corner 31514
(Le--94124-44). Kelantan: M. R. Henderson 29553 (Bz--22017). Pa-
hang: Balgooy 2483 (Ac, N); B. C. Stone 10872 (Kl--16782). Penang:
C. Curtis s.n. (W--206352, W--206353, W--206354). Perak: Burkill
13839 (Bz--22018); Poore 389 (Kl--389), 1106 (Kl--6106). Singa-
pore: T. Anderson 133 (Br, Pd); Ridley 3993 (Le--908266-1154, Le--
908266-1174). GREATER SUNDA ISLANDS: Batu: Collector undetermined
612 H.B. (Ut--43926). Borneo: Adou 32 [L. O. B. 4010; Boschproef-
st. BB.13963] (Bz--21898); Atiel 62 [1420; Boschproefst. BB.14980]
(Bz--21896, Bz--21897); Boschproefst. BB.13963 (Bz--21899), BB.
14980 (Le--93260-277); Jong 490/W.B. [Boschproefst. BB.8305] (Bz--
21904); Labohm 9 (Bz--21907), 90b (Bz--21906, Le--920248-203);
Posthumus 2248 (Bz--21902); Ramal s.n. [Oct. 1941] (Bz--21901);

Soeriodiherto 4 [4039; Boschproefst. BB.14083] (Bz--21900); Tryd 11 [Boschproefst. BB.13528] (Bz--21903. JAVA: Backer 1044 (Bz--21936), 7190 (Bz--21932, Bz--21933), 7267 (Bz--21941, Bz--21942), 10082 (Bz--21935), 26482 (Bz--21939, Bz--21940, Le--92268-355); Bakhuizen 2411 (Bz--21923, Bz--21924, Le--92268-338), 3379 (Ut--24868A); Birkhoff 11 (Bz--21922); Blume s.n. (Le--908267-681, Le--908267-693, Le--908267-694, Le--908267-695); Grashoff 135 (Le--920248-202); Ham s.n. [Bagelen] (Bz--21925, Bz--21926, Bz--21927); Herb. Lugd. Bat. 90990-766 (Le); Junghuhn s.n. (Le--908266-1162, Ut--43928); Koorders 9853♂ (Bz--21943, Bz--21944, Ca--265980, Le--923150-664), 29616♂ (Br, Br, Ca--236582, Le--923150-402, Le--923150-694, Pd); Kramer 5707 (Bz--21938), 5707a (Bz--21937); Kuhl & Van Hasselt 30 (Le--908267-872); Los 6545 (Bz--21929, Le--924341-662); Pistorius s.n. [Maart 1924] (Bz--21930, Bz--21931); Uhl 6225 (Bz--21934); Van Steenis 11761 (Bz--21928); Zippelius s.n. (Le--908266-1035). SUMATRA: Abdoelmoein 6 [Boschproefst. BB.31038] (Bz--21979), 11 [Boschproefst. BB.31043] (Bz--21978), 12 [Boschproefst. BB.31044] (Bz--21977), 20 [Boschproefst. BB.8946] (Bz--21971); Arsad 20 [Boschproefst. BB.9227] (Bz--21963); Bakarodin 34 [Boschproefst. BB.9074] (Bz--21980); Bokhorst 24 [Boschproefst. BB.6014] (Bz--21969); Bol 20 (Bz--21962); Boschproefst. 19.T.1.F.22 (Bz--21989, Bz--21993, Bz--21994, Bz--21995, Ca--235061, Le--923353-118, Le--924320-255), BB.2850 (Bz--22011, Le--923363-536), BB.2855 (Le--924331-206), BB.6014 (Bz--21970, Le--925206-888), BB.7716 (Bz--21975, Bz--21976, Le--925250-120, N, Ut--8153), BB.7094 (Bz--21981, Bz--21982), P.879 (Bz--21985), T.B.667 (Le--925206-903), T.B.879 (Le--925206-918, Le--925206-933), T.B.1097 (Ca--265978, Le--924342-384, Ut--80453); Boschwezen s.n. [l.I.92] (Bz--22014); Buwalda 63 [Boschproefst. BB.31735] (Bz--21983); Collector undetermined s.n. (Pd); Dirksen 14 (Bz--22012, Bz--22013, Le--923138-838); Dorst 19.T.1.P.22 (Bz--21988, Bz--21990, Bz--21992); J. M. Dumas 1597 (Le--920248-219); Endert 50 (Bz--22005, Bz--22006), 134 (Bz--22004, Le--920248-199); Forbes 2655 (Le--908141-710); Grashoff 135 (Bz--21952, Bz--21954); Gusdorf 90 (Bz--21996, Bz--21997), 173 (Bz--21955, Bz--21956, Bz--21957, Le--920248-193, Le--920248-194); Hasan 5 [Boschproefst. BB.7716] (Bz--21974); Herb. Bot. Bogor. 22001 (Bz); Idenburg 27 (Bz--21959); Koorders 10478♂ (Bz--25596), 10479♂ (Bz--22008, Bz--22009, Bz--25597, Le--923150-679); Korthals 1360 (Le--908267-684, Le--908267-696), s.n. (Le--908267-682, Le--908267-685); Lörzing 4042 (Bz--22003, N), 11127 (Bz--22002); Praetorius s.n. [Ao. 1834] (Le--908267-193); Pieters 45 [Boschproefst. BB.2850] (Bz--22010); Renwarin 90 [Boschproefst. BB.2833] (Bz--22007); Rutten-Kovistra 21 (Bz--21951); Saleh 6 [Boschproefst. BB.7995] (Bz--21965); Teijsmann 612 (Bz--21998, Bz--21999, Bz--22000), s.n. (Le--908266-1172, Le--908266-1182, Le--908266-1192); Thorenaar 19-T.I.P-22 (Bz--21991, Le--322244-83); Tjing 2 [Boschproefst. BB.8328] (Bz--21972, Bz--21973), 41 [Boschproefst. BB.9188] (Bz--21964); C. F. van der Twaan s.n. [Boschproefst. T.3.P.879] (Bz--21984, Bz--21986); C. J. van der Twaan s.n. [Boschproefst. 19.T.3.P.879] (Bz--21987); Van Steenis 3387 (Bz--21960), 3981 (Bz--21961, Le--93232-161); Verduyn Lunel 33

Boschproefst. T.B.1097] (Bz--21966); *Versteegh & Merkamal* 326 [Boschproefst. BB.32250] (Bz--21958); *Wohab* 15 [Boschproefst. T. B.667] (Bz--21967, Bz--21968). CULTIVATED: Java: *Backer s.n.* [Aug. 1909] (Bz--21912, Bz--21913); *Burger* 1048 [Herb. Hort. Bot. Bogor. XI.K.25] (Bz--21908), 2207 [Herb. Hort. Bot. Bogor. XI.K. 25] (Bz--21909); *Collector undetermined* 63 (Mi, N--photo, Z--photo); *Herb. Hort. Bot. Bogor.* 21910 (Bz), 21911 (Bz), 21914 (Bz), 21915 (Bz), 21916 (Bz), 21917 (Bz), 21918 (Bz), 21919 (Bz), 21920 (Bz), 21921 (Bz), *XI.K.25* (Bz--25871, Bz--25872, Bz, Bz, Bz, Bz), *XI.K.25a* (Bz--26595), *XI.K.25 en a* (Bz, Bz, Bz, N); *Jacobs XI.K. 25* (Ba); *Koorders* 29616 (Bz--21945, Bz--21946, Bz--21947, Bz--21948, Bz--21949, Bz--21950, Le--9235-351, Le--92339-20, Le--92339-46); *Sutrisno* 30 [Herb. Hort. Bogor. XI.J.4] (N). Sumatra: *Herb. Hort. Sibolangit* 7 (Bz--26510). Sweden: *Herb. Mus. Bot. Upsal. s.n.* [hort. bot. 1932] (N, S, S). LOCALITY OF COLLECTION UNDETERMINED: *Collector undetermined s.n.* (Pd); *Herb. Acad. Rheno-Trai. s.n.* (Ut--43927, Ut--43929); *Herb. Hort. Bot. Bogor.* 22015 (Bz), 25873 (Bz); *Herb. Lugd.-Bat.* 92268-370 (Le), 908267-683 (Le), 908267-697 (Le), 908267-698 (Le), 908267-699 (Le), 908267-700 (Le).

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NOTES ON THE GENUS *NEOSPARTON*

Harold N. Moldenke

Lack of time has forced me to abandon my original plans for a thorough and detailed monograph of this genus, but it has seemed advisable to place on record the miscellaneous notes, chiefly bibliographic, on this genus assembled by my wife and myself over the past fifty years. This is the 50th genus so treated by me in this series of notes in *PHYTOLOGIA*. The herbarium acronyms used hereinafter as the same as those used in all previous installments of these notes in this journal since 1933 and are fully explained in my Fifth Summary of the *Verbenaceae*.....(1971), pages 795 to 801.

NEOSPARTON Griseb., *Abhandl. Ges. Wiss. Gött.* 19: 245. 1874.

Synonymy: *Neosparyon* Griseb. ex Mold., *Alph. List Cit.* 3: 690, sphalm. 1949.

Bibliography: Hook., *Bot. Misc.* 1: 161, pl. 46. 1829; Steud., *Nom. Bot. Phan.*, ed. 2, 2: 749. 1841; D. Dietr., *Syn. Pl.* 3: 64. 1843; Schau. in A. DC., *Prodr.* 11: 545. 1847; C. Gay, *Hist. Fis. Chile Bot.* 5: 20. 1849; Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Miers, *Trans. Linn. Soc. Lond. Bot.* 27: 103. 1871; Griseb., *Abhandl. K. Ges. Wiss. Gött.* 19: 245, pl. 2, fig. 6. 1874; Griseb., *Pl. Lorentz.* [Abhandl. Ges. Wiss. Gött. 19:] 197--198, pl. 2, fig. 6. 1874; Benth. in Benth. & Hook., *Gen. Pl.* 2 (2):1144.

1876; Griseb., *Abhandl. K. Ges. Wiss. Göttingen*, 24: [Symb. Fl. Argent.] 279. 1879; Hieron., *Bol. Acad. Nat. Córdoba* 4: 407. 1881; F. Phil., *Cat. Pl. Vasc. Chil.* 219. 1881; R. A. Phil., *Anal. Mus. Nac. Chile Bot.* 1: *Cat. Praev. Pl. Itin. Tarap.* 60. 1891; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 147, 149, 150, 154, & 382, fig. 58 G--K. 1895; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 303 (1894) and imp. 1, 2: 1178. 1895; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 387. 1897; Kuntze, *Rev. Gen. Pl.* 3 (2): 254. 1898; Briq., *Ann. Conserv. Jard. Bot. Genève* 4: 22. 1900; Briq. in Chod. & Wilczek, *Bull. Herb. Boiss.*, ser. 2, 2: 543. 1902; Speg., *Anal. Soc. Cient. Argent.* 55: 242. 1902; Speg., *Nov. Add. Fl. Patag.* 2: 65. 1902; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 1, 291. 1903; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 1, 430. 1904; Thiselt.-Dyer, *Ind. Kew. Suppl.* 2: 123. 1904; Prain, *Ind. Kew. Suppl.* 3: 104. 1908; Reiche & Phil. in Reiche, *Estud. Crit. Fl. Chil.* 5: 295 & 303. 1910; M. Kunz, *Anatom. Untersuch. Verb.* 41. 1911; Seckt, *Anal. Soc. Cient. Argent.* 74: 185. 1912; Sanzin, *Anal. Soc. Cient. Argent.* 88: 96--100 & 134, fig. 1. 1919; Hauman, *Anal. Mus. Nac. Hist. Nat. Buenos Aires* 32: 473. 1925; Stapf, *Ind. Lond.* 4: 373. 1930; Hicken, *Sert. And.* 65. 1922; Stapf, *Ind. Lond.* 6: 428. 1931; Junell, *Symb. Bot. Upsal.* 1 (4): 30--31, pl. 2, fig. 1. 1934; Latzina, *Trab. Inst. Bot. Farm. Buenos Aires* 54: 112. 1935; H. S. Marshall, *Kew Bull. Misc. Inf.* 1936: 87. 1936; Mold., *Geogr. Distrib. Avicenn.* [1] & 29. 1939; Mold., *Prelim. Alph. List Inv. Names* 33 & 44. 1940; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 2, 291. 1941; Mold., *Suppl. List Inv. Names* 6 & 12. 1941; Mold., *Lilloa* 6: 431--433 (1941) and 8: 427. 1942; Mold., *Alph. List Inv. Names* 30, 33, & 45. 1942; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 42, 43, & 96. 1942; Mold., *Lilloa* 10: 345. 1944; Mold., *Phytologia* 2: 107. 1944; Covas & Schnack, *Darwiniana* 7: 86 & 89. 1945; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 303 & 1178. 1946; Mold., *Alph. List Cit.* 1: 95, 97, 142, 163, 235, & 250. 1946; Mold., *Alph. List Inv. Names Suppl.* 1: 16. 1947; Mold., *Alph. List Cit.* 2: 377, 384, 440, 599, 600, 628, & 629. 1948; H. N. & A. L. Mold., *Pl. Life* 2: 24, 30, 43, & 55. 1948; Mold., *Alph. List Cit.* 3: 672, 690, 812, 813, 894, 900, 909, & 911 (1949) and 4: 1120 & 1128. 1949; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 101, 105, & 191. 1949; Metcalfe & Chalk, *Anat. Dicot.* 1032 & 1040. 1950; Acevedo de Vargas, *Bol. Mus. Nac. Hist. Nat. Chile* 25: 45--46. 1951; Cabrera, *Revist. Mus. La Plata*, ser. 2, Bot. 8 (30): 87--168. 1952; Angely, *Cat. Estat. Gen. Bot. Fan.* 17: 5. 1956; Darlington & Wylie, *Chromos. Atl.*, imp. 1, 323 & 512. 1956; Anon., *Taxon* 6: 243. 1957; Cabrera, *Revist. Invest. Agric.* 11: 331, 368, & 398. 1957; Troncoso, *Darwiniana* 11: 163--192, pl. 3--5, fig. 1--14. 1957; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 2, 430. 1958; DeRoos, *Internat. Direct. Spec.* 229. 1958; Burkart, *Excerpt. Bot. A.l.* 444. 1959; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 291. 1959; Mold., *Résumé* 121, 126, 312, 321, 357, & 463. 1959; Emberger in Chadeaud & Emberger, *Traité Bot.* 2: 829. 1960; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 303 & 1178. 1960; Muñoz Pizarro, *Espec. Pl. Descr. Philip.* 110. 1960;

Mold., Résumé Suppl. 2: 9. 1960; Rahn, Bot. Tidssk. 56: 123. 1960; Cave, Ind. Pl. Chromos. Numb. 2: 63. 1961; Darlington & Wylie, Chromos. At., imp. 2, 323 & 512. 1961; Hansen, Excerpt. Bot. A.3: 208. 1961; Böcher, Hjerting, & Rahn, Dansk Bot. Arkiv 22: 108. 1963; Dalla Torre & Harms, Gen. Siphonog., imp. 3, 430. 1963; Mold., Phytologia 9: 113 & 114. 1963; Troncoso in Böcher, Hjerting, & Rahn, Dansk Bot. Arkiv. 22: 108--109. 1963; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 189. 1965; Mold., Phytologia 12: 27 & 29. 1965; Troncoso in Cabrera, Fl. Prov. Buenos Aires 5: 122--125, fig. 43. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 768. 1966; G. Taylor, Ind. Kew. Suppl. 13: 93. 1966; McGinnes in McGinnes, Goldman, & Paylore, Deserts World 438, 490, & 499. 1968; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 1, 716. 1969; Heusser, Pollen Spores Chile 62 & 82, pl. 59-674. 1971; Mold., Fifth Summ. 1: 192 & 199 (1971) and 2: 553, 573, 652, 754, & 895--896. 1971; Mukhopadhyay, Pollen Morph. Verb. [thesis]. 1971; Rouleau, Taxon Index 1: 247. 1972; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Techn. 12 (1): 163 (1972) and 12 (2): 87. 1973; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 788. 1973; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 2, 716. 1974; Troncoso, Darwiniana 18: 296, 300, 302, 306, 328--330, & 410, fig. 7. 1974; Hunziker, Kurtziana 9: 141. 1976; Rogerson & Becker, Bull. Torrey Bot. Club 103: 234. 1976; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Techn. 13: 160 & 328. 1976; Anon., Biores. Index 13 (4): B.191. 1977; Mold., Phytologia 36: 507. 1977; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40, 41, 45, & 47. 1978; Mold., Phytologia 44: 136, 138, & 509 (1979) and 45: 40. 1980.

Grisebach's original (1874) description of this genus is:

"Calyx membranaceus, campanulato-tubulosus, subtruncatus, minute 5dentatus, denticulis ciliatis. Corolla infundibuliformis, limbo aequaliter 5lobo imbricativo. Stamina didynama, inclusa, corollae tubo superne inserta, antheris bilocularibus. Ovarium minutum, disco cupulari basi inclusum, biloculare, loculis uniovulatis, ovulis erectis; stylus filiformis, terminalis, stigmatibus oblique capitato. Drupa abortu monococca, margine utrinque in carinam alatum producta, calyce ampliato inclusa. Semen albuminosum, subcylindricum, embryoni axili, albumine corneo, radícula infera. -- Frutex glaber, aphyllus, ramis oppositis v. verticillatis, strictis validis apice pungenti-acutis, internodiis elongatis cylindricis striatis; spicae breves, ad nodos sessiles, bracteis minutis. Genus habitu *Ephedrae* insigne, cum *Verbena aphylla* Gill. comparandum, quae spicis longe pedunculatis a nostra specie differt."

Troncoso (1974) describes *Neosparton* as a "Género endémico argentino, con 4 especies distribuidas en áreas geográficas fragmentarias, desde Salta hasta el N de la Patagonia en la zona andina, Santa Cruz y sur de la prov. de Buenos Aires.....Las referencias para el país transandina basadas en las citas de R. A. Philippi... 1891, para Antofagasta y de O. Kuntze.....1898 para Chile: Paso Cruz, deben referirse a Antofagasta de la Sierra, prov. de Catamarca, y a Mendoza, respectivamente". As to economic uses she asserts that "En el norte argentino se la emplea para techar ranchos".

Sanzin (1919) separates the two species of the genus known to him as follows:

"Espigas terminales alargadas.....*N. aphyllum*.
Espigas laterales, cortas.....*N. ephedroides*."

Bentham (1876) characterizes the genus as follows: "Calyx tubulosus, minute 5-dentatus. Corollae tubus exsertus, superne amplius; limbus patens, lobis 5, aequalibus. Stamina 4, didynama, inclusa (v. breviter exserta?); antherae ovatae, inappendiculatae, loculis parallelis. Ovarium disco, breviter cupulato insidens, 2-loculare, loculis 1-ovulatis; stylus filiformis, stigmatibus obliquo crassiusculo. Fructus drupaceus, abortu 1-pyrenus, ad utrumque latus in carinam alatum productus, calyce ampliato inclusus. Semen subcylindraceum, albuminosum. -- Frutices glabri, aphylli, ramis junceis teretibus oppositis v. verticillatis strictis validis. Spicae globosae v. ovoideae, densae; ad nodos sessiles, multiflorae. Flores sessiles. Bractae minutae (v. ovatae calycem aequantes caducae).... Genus evidenter cum *Bailonia* inter *Verbenam*, *Boucheam* et *Lippiam* quasi medium tenet, ab omnibus tamen diversum seminibus, si revera albuminosa sint."

Briquet (1894) modified this generic description to "Kelch röhrlig, undeutlich 5zählig. Blkr. mit exserteter, nach oben zu weiterter Röhre; Saum ausgebreitet, gleich 5lappig. Stb. 4, 2mächtig, $\frac{1}{2}$ eingeschlossen; A. eiförmig, mit parallelen Thecae. Gynäceum aus 1 2fächerigen Frkn. gebildet. Gr. fadenförmig, mit verdickter, scgiefer N. Steinfr. beiderseits 2flügelig, mit 1 einzigen Stein (durch den Abort der 1 Sa.). S. mit Nährgewebe (ob auch zur Zeit der vollen Reife?). -- Kahle, blattlose Sträucher mit *Juncus*-artigen, steifen, glatten, gegenständigen oder quirlständigen Zweigen. Ähren kugelig oder eiförmig, mit gedrängten Bl., an der Frkn. sitzend, vielblütig. Bl. sitzend. Brakteen klein, oder grösser, aber abfällig. 2 Arten in extra-tropischen Südamerika."

Junell (1931) avers that "Der Bau des Gynäceums zeigt grosse Übereinstimmung mit dem bei *Stachytarpheta* und *Bouchea*, und zwar zufolge des Umstands, dass die Verwachsung zwischen der Mittelpartie des Fruchtblatts und den nach innen gekrümmten Rändern desselben erst ziemlich hoch oben im Fruchtknoten stattfindet, am besten mit dem bei *B. garepensis*. Wie sich aus Taf. II, Fig. 1 ergibt, zeigt die Mittelpartie des Fruchtblatts auch Wachstum nach innen. In der Höhe, wo die Verwachsung mit den Fruchtblatträndern stattfindet und eine gewisse Strecke darunter ist diese ausgebauchte Partie im allgemeinen gespalten. Auch der Samenanlagen besitzen denselben Bau wie die von *B. garepensis*. Die Mikropyle ist lang; bei *N. aphyllum* habe ich Pollenschläuche in der Mikropyle beobachtet. Der obere Teil des Embryosacks ist erweitert. Aus Taf. II, Fig. 1 ergibt sich, dass die innere Zellschicht des Kelches stark verdickte Zellenwände besitzt. Eine ähnliche Ausbildung der äusseren Blütenhülle findet man auch bei gewissen *Verbena*-Arten. Bemerkenswert ist, dass bei dieser Gattung die eine Samenanlage abortiert, sodass die Frucht nur einen Samen enthält. Die Frucht soll eine Steinfrucht sein."

[to be continued]

A NEW COMBINATION IN AGALINIS (SCROPHULARIACEAE)

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Missouri Botanical Garden
Box 299, St. Louis, Missouri 63166

Agalinis lanceolata (R. & P.) D'Arcy, comb. nov.
Virgularia lanceolata R. & P., Fl. Peruv. & Chil. Prodr.
92, t. 1794.

This combination was omitted in two previous publications on the nomenclature of Agalinis:

D'Arcy, W.G., 1978. Names in *Agalinis* for some plants that were called Gerardia and Virgularia (Scrophulariaceae). Ann. Missouri Bot. Garden 65: 769-771.

D'Arcy, W.G., 1979. Proposal to conserve the name Agalinis Raf. (1837) against Virgularia Ruiz & Pavon (1794) Scrophulariaceae. Taxon 28: 419-422.

HUNZIKERIA: A CLARIFICATION

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The generic name Hunzikeria D'Arcy, commemorating the name of Armando T. Hunziker of Cordoba, Argentina, was published with an -ia termination, the i being added for euphonic reasons. This conforms with Paragraph 1 of Article 20 of the International Code of Botanical Nomenclature, 12th International Botanical Congress, Leningrad, July 1975 (published by Bohn, Scheltema & Holkema, Utrecht 1978). To date this name has been spelled this way by the author in the original publication (Phytologia 24: 283. 1977) and in a subsequent publication (Ann. Missouri Botanical Garden 65: 698-724. 1978).

KEY TO HAWAIIAN SPECIES OF RAUVOLFIA (APOCYNACEAE)
Hawaiian Plant Studies 99

Harold St. John
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The genus Rauvolfia (Apocynaceae) in Hawaii was long considered to consist of the single species R. sandwicensis A. DC. Then Sherff (1947) revised it and treated it as with seven species and two varieties. Sherff had the ability to discriminate and recognize taxa, but his keys are mostly impractical and unworkable, and his key to Rauvolfia is such a one. It depends heavily on leaf width and shape, with choices between: mostly narrow, versus mostly broader; and obtuse, versus mostly subacuminate. Students of the Hawaiian flora have been frustrated with this key, and tend to reject all his taxa in this genus.

When Sherff's revision appeared, the writer investigated the Hawaiians collections of it, and agreed that there were seven species, single island endemics, except one common to Molokai and Lanai. The two varieties described by Sherff are here reduced to synonymy. The writer made a new key to these species which he considers more practical. By request he is printing it to make it available.

Key to Species

- Calyx 1-2.3 mm long,
Calyx 2-2.3 mm long; inflorescence loose; stone 3-4 mm thick, the cavity in X-section 1.2 mm wide.
Hawaii. R. remotiflora.
- Calyx 1-2 mm long; inflorescence dense,
Corolla 11-12 mm long; stone 4.5 mm thick, the cavity in X-section 1.2 mm wide.
Molokai, Lanai. R. molokaiensis.
- Corolla 8-9 mm long,
Corolla lobes 1.6-3 mm long; stone 4 mm thick, 9 mm long, in X-section the cavity 1.5 mm wide.
Kauai. R. Helleri.
- Corolla lobes 1.2-1.3 mm long; stone 4.5 mm thick, 10.5 mm long, the cavity in X-section 1.8 mm wide. Maui. R. mauiensis.
- Calyx 3-5 mm long,
Calyx (3.5-5 mm long), the lobes broadly obovate, broadly obtuse or truncate; stone cavity in X-section 1.2 mm wide. Oahu, Waianae. R. Degeneri.

Calyx lobes ovate,

Corolla 8.5-11 mm long; (calyx 3-4.5 mm long);
blades elliptic to oval, 2-3½ times as long
as broad; stone cavity in X-section 1.7 mm
wide. Oahu, Koolau Range. R. sandwicensis.

Corolla 7-8 mm long; (calyx 4-5 mm long);
blades narrowly elliptic, 3½-4 times as long
as wide; stone cavity in X-section 1.8 mm wide.
Oahu, Koolau Range. R. Forbesii.

R. *Helleri* Sherff, Field Mus. Nat. Hist., Bot. Ser.
23: 329-330, 1947.

R. sandwicensis A. DC., var. subacuminata Sherff,
Field Mus. Nat. Hist., Bot. Ser. 23: 326, 1947.

R. *molokaiensis* Sherff, Field Mus. Nat. Hist., Bot.
ser. 23: 326-327, 1947.

R. molokaiensis Sherff, var. parvifolia Deg. &
Sherff, Field Mus. Nat. Hist., Bot. Ser. 23:
327, 1947.

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1947. A Preliminary Study Of The Hawaiian Species
Of The Genus *Rauvolfia* (Plum.) L. Family
Apocynaceae. Field Mus. Nat. Hist., Bot. Ser.
23: 321 -331, pl. 1.

TILLANDSIA VALENZUELANA A. RICH. IN THE BAHAMAS

W. Hardy Eshbaugh, Charles R. Werth, and Thomas K. Wilson

Department of Botany
Miami University
Oxford, OH 45056

During the past three years we have been teaching a course on the Tropical Flora of the Bahamas at the Forfar Field Station just south of Stafford Creek on North Andros Island. To support the teaching of the local flora a selected collection of some 260 specimens was made during May and June of 1977 and 1979. Several interesting discoveries have been made in the course of our collecting on Andros Island one of which is reported here.

Tillandsia valenzuelana A. Rich. was first reported from the Bahamas by Britton and Millspaugh in The Bahama Flora. They indicated that the plant occurred on trees in coppices in the Marsh Harbor region of Abaco. Since that time there has been an additional report of this species from Grand Bahama.

Although the plant is considered rare in the Bahamas we found several individuals of this species growing along a storm ridge adjacent to a bail road 2 miles west of Stafford Creek settlement. We did not note the tree species with which these plants were associated. Our collection was verified by Donovan S. Correll and is an unnumbered specimen collected by C. Werth and V. Baird in May 1977. The specimen bears a Miami University (MU) accession number 125883.

This interesting extension of the range of this species in the Bahamas suggests the need for much more extensive field studies of the flora of the Bahamas. As the largest of the islands in the Bahaman Archipelago, Andros Island is still relatively poorly known floristically. The range extension of other species might be anticipated as the isolated coppices of this island become better known.

BOOK REVIEWS

Alma L. Moldenke

"ENGLISH-SPANISH SPANISH-ENGLISH ENCYCLOPEDIA DICTONARY OF TECHNICAL TERMS" edited by Javier L. Collazo, Volume I English-Spanish A--N, lxxv + 880 pp. Volume II English-Spanish O--Z, xv + 881--1787 pp. Volume III Spanish-English A--Z, xv + 430 pp. McGraw-Hill Book Company, New York, N. Y. 10020. 1980. \$142.00.

Since Latin is becoming more and more eclipsed as the universal language of the scientists, with English replacing it almost everywhere, this excellent encyclopedic dictionary will prove exceedingly useful throughout the American continent, the Philipines and Spain and cognately so in Brazil and Portugal. The English to Spanish volumes have over 100,000 entries and the Spanish to English volume over 43,000 entries. Throughout there are over 41,000 cross-references. The whole set is carefully compiled and carefully published. Even though taxonomic and ecological botany may be somewhat shortchanged in favor of aeronautics, systems engineering, television and ultrasonic terms, my husband and I have found helpful information here, all within an hour of receipt of the set!

"THE POLLINATION OF FLOWERS BY INSECTS" edited by A. J. Richards, xi + 213 pp., b/w. illus. as 42 fig., 26 tab., 3 maps + 43 photo. and 1 color plate. Published by Academic Press, London NW1 7DX and New York, N. Y. 10003 for the Linnean Society of London [1978] 1979. \$29.00.

This valuable collection of 20 fascinating papers comes from a symposium held at the University of Newcastle upon Tyne and is published jointly as the Linnean Society Symposium Series No. 6 and as No. 16 of the Botanical Society of the British Isles Conference Reports. A few of the highlights are: Faegri's "Trends in Research in Pollination Ecology" citing phytocoenosis relationship and elucidating pollen-stigma interactions through microchematography; Corbet's "Bees and the Nectar of *Echium vulgare*" with varying visitations as water and sugar content vary; Stelleman's detective work with dyed pollen grains showing that *Plantago lanceolata* is insect (by syrphid flies against the wind) as well as wind pollinated; Kevan's color plate showing four different blossoms with one side as humans see their coloration and the other side as insects (bees) do. This is one symposium report in which each paper has much to offer to interested readers, of whom there should be many.

"THE ILLUSTRATED FLORA OF ILLINOIS -- WILLOWS TO MUSTARDS" by Robert H. Mohlenbrock, xiv + 286 pp., illus. by 126 b/w line draw. plates + 126 geog. distrib. maps + 1 state-county map. Southern Illinois University Press, P. O. Box 3697, Carbondale, Illinois 62901. 1980. \$18.00.

This is the 7th volume in this series that is of ever-growing value to amateur, student and professional botanists. The whole page drawings are pleasantly natural to look at and illustrative of definitive characters without being "text-bookly" or contorted. The matching keys and text are easily workable for the 44 genera and their 117 species, 17 lesser taxa and 4 hybrids in the *Salicaceae*, *Tamaricaceae*, *Capparidaceae*, *Resedaceae* and *Brassicaceae*. Scientific names, their authorities and sources, common names, habitats, ranges, Illinois distributions and flowering times are all given. Mohlenbrock has authored and edited all volumes to date. A phenomenal task, especially along with a fulltime teaching schedule!

"HOW TO IDENTIFY MUSHROOMS TO GENUS I. Macroscopic Features", Second Edition by David L. Largent, 86 pp., b/w illus. of 131 line draw. + 2 tab. Mad River Press Inc., Eureka, California 95501. 1978. \$3.85 paperbound.

This book should provide facile "happy hunting" for the amateur field mycophile because of the excellent simple illustrations by Sharon Hadley and the helpful text. For college and university students taking field and/or ecological courses dealing with the larger fungi this book and its subsequent volumes make easy "stepping stones" to Smith's "The Mushroom Hunter's Field Guide" and "Mushrooms in Their Natural Habitats", as well as to similar texts.

"HOW TO IDENTIFY MUSHROOMS TO GENUS II. Field Identification of Genera" by David L. Largent and Harry D. Thiers, iii + 32 pp. Mad River Press Inc., Eureka, California 95501. 1978. \$2.50 paperbound.

"One of the purposes of this book is to explain to individuals interested in identifying fleshy fungi just how we recognize genera in the field". This is done usually without a key; one is provided at the end of Volume I. "A second purpose....is to introduce several of the segregate from Fries genera, particularly those that can be recognized using only macroscopic features." These macroscopic features are capitalized (uppercased) within each of the alphabetized genera.

"HOW TO IDENTIFY MUSHROOMS TO GENUS III. Microscopic Features" by David Largent, David Johnson and Roy Watling (Consultant), v + 148 pp., 100 b/w photo + 36 fig. Mad River Press Inc., Eureka, California 95501. 1978. \$7.25 paperbound.

"In the modern or contemporary classification of agarics, and to some extent the boleti, microscopic features are emphasized" as in this volume with its full directions for preparing slides, explanations of the many spore and other plates and its good photographs and excellent drawings by Kathryn Simpson. There is a combined glossary and index annotated with examples.

"HOW TO IDENTIFY MUSHROOMS TO GENUS IV. Keys to Families and Genera" by Daniel E. Stuntz, iv + 94 pp. Mad River Press Inc., Eureka, California 95501. 1979. \$4.50 paperbound.

These keys are a combination of three consisting of (1) Elias Fries' famous dichotomous key based on macroscopic features and published at the end of Volume I in this series, (2) Rolf Singer's revision of the pertinent Friesian genera in the third edition of "Agaricales in Modern Taxonomy", a very detailed and therefore difficult one, and (3) Stuntz' own key which was part of his doctoral studies in which he separated by Unisort Cards Singer's many key characteristics and criteria into fewer minimally pertinent ones to make more readily operable keys that are published in this volume.

These four volumes become a naturally graduated guide in detail, scope and complexity for information re "happy mushrooming" wished by the authors.

"CHECKLIST OF UNITED STATES TREES (Native and Naturalized)" by Elbert L. Little Jr., iv + 375 pp. Forest Service, United States Department of Agriculture, Washington, D. C. 1979. Available from U. S. Gov't Printing Office, Washington, D. C. \$10.00

This is the Agriculture Handbook No. 541, superseding No. 41 of 1953, also by Little, and treating 748 species in 244 genera in 76 families, adding Alaska but not Hawaii. Some new tropicals and some recent naturalizations are also added along with modern taxonomic changes such as reducing *Crataegus* from 150 to 35 species. This checklist compiles alphabetically the scientific names with citations, current synonyms, approved common and lumber names, important varieties, natural interspecific hybrids with parentage, and geographic ranges gleaned from the recently completed 6-volume "Atlas of the United States Trees". This book can also be used for Canadian trees. There are 8 appendices. It is amazing how much orderly, easily accessible information is condensed into this excellent, compact, inexpensive form. All kinds of libraries and schools should have this book.

"LA VÉGÉTATION SUR L'ÎLE-AUX-BASQUES: Nomenclature Scientifique, Française et Anglaise" by Jean Smith, 28 pp; La Société Provancher d'Histoire Naturelle du Canada. 1979. Paperbound, pocket-size.

A springtime collecting trip in 1976 by J. Smith made possible a modernization of Fr. Marie-Victorin's earlier records to the total of 240 vascular plant species and 67 bryophytes and lichens verified.. The listing comes in 3 matching columns grouped by families with (1) the scientific, (2) the French, and (3) the English names. The work should prove conveniently useful on field trips to this island.

"ENVIRONMENTAL QUALITY AND WATER DEVELOPMENT" edited by Charles R. Goldman, James McEvoy III and Peter J. Richerson, viii + 510 pp., b/w illus. of 70 fig., 21 tab., 3 photo., + 9 maps; W. H. Freeman and Company, San Francisco, California 94104. 1973. \$28.50.

This report, originally for the National Water Commission, is still very important because of its astute analyses of the problem and its excellent recommendations. These latter include: (1) Greatly increased public participation in planning, (2) extended evaluations that include analyses of the social and the natural environment checked by integrative and innovative techniques, benefit-cost studies, demographic projections of requirements, law improvement and the establishment of a separate governmental agency. A series of papers on evaluating specific cases follows, such as: man's effect on the Great Lakes, Bodega's intense controversy, and decision-making at local, state, federal and international levels.

"GENERIC OF HOST-PARASITE INTERACTION" by Peter R. Day, xii + 238 pp., and b/w illus. of 33 fig., 25 photo. and 23 tab. W. H. Freeman Company, San Francisco, California 94104. 1974. \$19.00.

That this fine text is still selling for more than twice its original price indicates that its orientation is still pertinent and forward-looking. It is directed "to advanced undergraduates, research students, and researchers in genetics, plant breeding, plant pathology, entomology, and related fields.....Important developments in the study of plant-parasite interaction include the extension of Flor's gene-for-gene concept to a range of interactions, the use of isogenic lines and temperature-sensitive genes in the study of the biochemistry of disease resistance, and the heightened interest in biological controls arising from dissatisfaction with pesticides" and the limitations on breeding for resistance. The last chapter, Genetics of Epidemics, is particularly well presented.

PHYTOLOGIA

A cooperative nonprofit journal designed to expedite botanical publication

Vol. 45

April 1980

No. 5

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$11.00 in advance or \$12.00
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中国苦苣苔科植物的研究(续)

王 文 采

(中国科学院北京植物研究所)

NOTULAE DE GESNERIACEIS SINENSIBUS (CONTINUED)

Wang Wen-tsai

(Institutum Botanicum Pekinense Academiae Sinicae)

[Translated by Hayden M. Wetzel (1514 Seventeenth Street, N.W., #108, Washington, DC 20036) and Laurence E. Skog (Department of Botany, Smithsonian Institution, Washington, DC 20560), from the Chinese originally published in Acta Phytotaxonomica Sinica 13(3): 97-105, 1975. This translation was done with the kind permission of the author; publication was made possible by a generous gift from Mrs. Bea Gold, Miami Beach, FL, and the Elvin McDonald Research Fund of the American Gloxinia and Gesneriad Society, Inc.

[This is the second part of the article; the first part appeared in Phytologia 45: 301-320, 1980. A translation of Wang Wen-ts'ai's "Taxa Nova Gesneriacearum e Flora Tibetica" (Acta Phytotax. Sin. 17(1): 110-111, 1979) was published in Phytologia 45(1): 31-34, 1980.

[The Wade-Giles system of transliteration has been used throughout. The author's name is properly spelled Wang Wen-ts'ai; future publications from China will use the pinyin system of Romanization, in which the name will be written Wang Wencai. Corrections and additions have been made in starred footnotes or brackets.]

THE FUNNELFORM GESNERIAD GENUS --

Didissandra Clarke

Didissandra Clarke in DC. Monogr. Phan. 5: 65 (1883); Burtt in Not. Bot. Gard. Edinb. 21: 196-198 (1954).

Raphiocarpus Chun in Sunyatsenia 6: 273 (1946), syn. nov.

THE GLABROUS DIDISSANDRA -- D. sinica

Didissandra sinica (Chun) W. T. Wang, comb. nov.
[Acta Phytotax. Sin. 13(3): 97, 1975]

Raphiocarpus sinicus Chun, l.c. 275, fig. 32,
pl. 44 (1946).

Kwangsi: Shih-wan Ta-shan, Liang Hsiang-jih
69820, T'ai Jen-ch'ang 8310; Lung-chou, Ta-ch'ing
Mt., Liang Hsiang-jih 65870. (The above specimens
are all syntypes)

Distribution: Kwangsi (endemic).

The corolla of this species is funnelform, with 4 fertile stamens, and the same as in the genus Didissandra Clarke. Ch'en Huan-yung [Chun Woon-Young] in 1946 established the new genus Raphiocarpus Chun upon the basis of this species, but accepting W. G. Craib's incorrect inclusions for Didissandra, he compared his new genus with the latter. W. G. Craib in 1919 possibly overlooked the then monospecific genus Corallodiscus Batal., and took many species from that correct genus and described these species in the genus Didissandra, and upon these species produced his general definition of genus "Didissandra"^{1,2}. Therefore the definition that he established for the genus "Didissandra" actually equals the definition of the genus Corallodiscus. In 1947, B. L. Burtt realized Craib's error, and moved to the genus Corallodiscus all the relevant new species from the latter's 1919 description³. In 1962, B. L. Burtt in writing the generic keys to the Gesneriaceae of the Old World pointed out the subtle differences between Raphiocarpus Chun and Didissandra Clarke, although he had not seen specimens of this species and had not yet made a decision as to its placement⁴.

¹W. G. Craib, Gesneracearum novitates. Not. Bot. Gard. Edinb. 11: 240-249 (1919).

²_____, Didissandra and allied genera in China and N. India, loc. cit. 11: 255-261 (1919).

³B. L. Burtt, Didissandra and Corallodiscus, Gard. Chron., III, 122: 204, 212 (1947).

⁴_____, Studies on the Gesneriaceae of the Old World XXIV: Tentative keys to the tribes and genera, Not. Bot. Gard. Edinb. 24: 213, 215 (1962).

THE FUNNELFORM GESNERIAD -- D. sinoophiorrhizoides

Didissandra sinoophiorrhizoides W. T. Wang,
nom. nov. [Acta Phytotax. Sin. 13(3): 98, 1975]

Lysionotus ophiorrhizoides Hemsl. in Journ.
Linn. Soc. Bot. 26: 224 (1890), non Didissandra
ophiorrhizoides K. Schum.

Didymocarpus cavaleriei Lévl. in Fedde, Rep.
sp. nov. 9: 453 (1911), non Didissandra cavaleriei
Lévl. et Vant.

Anna ophiorrhizoides (Hemsl.) Burt et
Davidson, in Not. Bot. Gard. Edinb. 21: 233, cum
descr. ampl. (1955); Burt, l.c. 22: 305 (1958).

Szechuan: Omei Mt., 850-1200 m above sea level,
Fang Wen-p'ei 2455, Cheng Wan-chun 6739, Liu Sheng-o
[Liu Tchen-ngo] et al. 948, Yang Kuang-hui 57539,
Faber, unnumbered (Holotypus, photograph seen).

Distribution: Szechuan, Kweichow.

F. Pellegrin in 1930 described a new genus Anna
Pellegr.⁵, containing one species A. submontana Pel-
legr., endemic to N Yunnan. This genus has a fun-
nel-form corolla, has 4 fertile stamens, and is ex-
tremely close to Didissandra Clarke, the only point
of difference with the latter being that the bracts
are large, rotund, and cover the inflorescence
before anthesis is complete. B. L. Burt et R.
Davidson in 1955 (see the above study) found Lysio-
notus ophiorrhizoides Hemsl. whose description has
characteristics similar to the A. submontana
Pellegr., and moved the former to the genus Anna
Pellegr. But the bracts characteristic of some
species of genus Didissandra Clarke also have this
condition, such as D. begoniifolia Lévl., and since
we feel that to establish a new genus only on the
basis of the bract characteristic is not acceptable,
we now return this species to the genus Didissandra
Clarke.

This species is a small shrub, close to the
aforementioned species D. sinica (Chun) W. T. Wang,
but it can be distinguished by its stem, and leaves
which are sparsely puberulent, the leaves lanceo-
late, bracts relatively large, rotund, while the
stem and leaves of D. sinica are both glabrous, the

⁵ F. Pellegrin, Anna, genre nouveau de Gesnéracées
d'Indo-Chine, Bull. Soc. Bot. France, 77: 45 (1930).

leaves long elliptic, bracts relatively small, and elongate lanceolate.

In "Iconographia Cormophytorum Sinicorum" volume 4 page 133 there is a figure of D. sinoophiorrhizoides, which can be consulted.

THE LONG-TUBED DIDISSANDRA -- D. macrosiphon

Didissandra macrosiphon (Hance) W. T. Wang, comb. nov. [Acta Phytotax. Sin. 13(3): 98, 1975]

Chirita? macrosiphon Hance in Ann. Sci. Nat. ser. 5, 5: 231 (1866); Clarke in DC. Monogr. Phan. 5: 131 (1883); Hemsl. in Journ. Linn. Soc. Bot. 26: 231 (1890).

Kwangtung: Chao-ch'ing, Ting-hu Mt., in a forest on damp rocks, Hou K'uan-chao [Hou Foon-chew] 74141, T. Sampson (Hance n. 7562 in Herb. propr.) (Holotypus, photograph seen); Hsin-yi, Huang Chih 37736.

Distribution: Kwangtung, Kwangsi.

The corolla of this species is long funnelform, with 4 fertile stamens, the same as in the genus Didissandra Clarke. This species is an annual herb, leaves densely pubescent, relatively close to D. begoniifolia Lévl., but this species can be distinguished by the flowers which are borne singly and axillary, bracts caducous, corolla orange red, long funnelform, ca. 6 cm long, below the middle suddenly becoming thin so as to be rounded cylindric; D. begoniifolia (distributed in SE Yunnan and SW Kweichow) has an umbellate inflorescence, bracts rounded ovate, to 2.4 cm long, to 3 cm broad, corolla purple, funnelform, gradually becoming thin from the top to the bottom, to 5 cm long.

THE CORAL GESNERIAD GENUS --
Corallodiscus Batal.

THE STONE FLOWER -- C. flabellatus

Corallodiscus flabellatus (Craib) Burtt in Gard. Chron. ser. 3, 122: 212 (1947).

THE BRIGHT-CALYX VARIETY -- var. leiocalyx

The type variety's pedicel and calyx all have either a dense or sparse rust-colored villous indument, while this new variety has pedicels glabrous or very quickly becoming glabrous, calyx is entirely glabrous.

var. leiocalyx W. T. Wang, var. nov. [*Acta Phytotax. Sin.* 13(3): 99, 1975]

A var. flabellato pedicellis glabris vel cito glabrescentibus, calyce glabro differt.

Tibet: Yi-kung, 2200 m above sea level, on rocky cliffs on a mountainside, corolla white, tube light purple, 19 July 1965, Ying Chun-sheng [Ying Tsün-shen], Huo Teh-yuan 649 (Holotypus); Lin-chih, Ni-hsi, 3040 m above sea level, on dry rocks on a mountainside, flower white, tube base purple blue, 28 July 1965, Chang Yung-t'ien, Lang K'ai-yung [Lang Kai-yung] 1082; Lung-tzu, Ko-hsi, 3700 m above sea level, gravel on a mountain-side, 21 August 1960, Ch'uan Kuo-hsun 639.

THE HORSE-BELL GESNERIAD GENUS --

Oreocharis Benth.

THE BRIGHT-LEAVED LOTUS-ON-A-ROCK -- O. leiophylla

Perennial acaulescent herb. Leaves ca. 5, all borne from the base; leaf blades elliptic ovate or ovate, 5-8 cm long, 3.6-5.5 cm broad, apex acute, base slightly cordate or nearly truncate, margin with shallow small obtuse teeth, both sides glabrous or nearly glabrous, lateral veins ca. 6 and opposite; the petioles 3-7.5 cm long, with a dense tan puberulence. Scapes ca. 2, ca. 11 cm tall, with tan pubescence; cymes umbellate, with 11-13 flowers; bracts elongate lanceolate, ca. 6 mm long; the pedicels thin, ca. 10 mm long, with brown puberulence; the calyx ca. 2 mm long, 5 lobes divided to near the base, the lobes linear lanceolate, with sparse long marginal hairs; corolla white (?), oblique campanulate, ca. 3.5 mm long, glabrous, limb obscurely bilabiate, of 5 nearly equal lobes, the lobes oblong, ca. 1.5 mm long; stamens 4, distinct, well exerted, glabrous, anthers broadly ovate, 0.5 mm long; disk annular, glabrous; pistil glabrous.

This species is close to the Big-leaved *Oreocharis* -- *O. benthamii* Clarke, but they can be distinguished by the leaf blades which are glabrous or nearly glabrous, and the flowers relatively small; *O. benthamii* has the leaf blades' adaxial sides densely puberulent, abaxial sides with rust-colored tomentose indument, and the corolla ca. 9 mm long.

Oreocharis leiophylla W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(3): 99, 1975]

Affinis *O. benthamii* Clarke, sed foliorum laminis glabris subglabrisve, floribus multo brevioribus (corolla circ. 3.5 mm longa) differt.

Fukien: Lien-ch'eng, Lo-ti, 20 October 1932, Lin Yung [Ling Yong] 4182 (Holotypus).

THE ERECT-PETALLED GESNERIAD GENUS --
Ancylostemon Craib

THE LOW ANCYLOSTEMON -- *A. humilis* Plate 15, figure 6.

Perennial low-growing acaulescent herb. Leaves 8-17, all borne from the base; the leaf blades ovate, elliptic ovate or elliptic, 1.1-2.2 cm long, 0.7-1.2 cm broad, apex somewhat obtuse, base rotund or slightly cordate, margin crenate, both sides with rust-colored villous indument or adaxial side becoming glabrous, veins on adaxial side frequently immersed, or abaxial side prominent; the petioles 1.8-3.6 cm long, with rust-colored villous indument. Scapes 1-4, 5.5-7.5 cm tall, indument similar to that of the petioles, becoming glabrous; cymes frequently umbellate, of 1-4 flowers; bracts linear, 2-4 mm long, villous; the calyx ca. 2 mm long, outside sparsely puberulent, 5 lobes divided to near the base, the lobes linear lanceolate, apex blunt; the corolla light yellowish white, tubular funnel-form, ca. 11 mm long, outside with extremely short pubescence, inside glabrous, the limb bilabiate, upper lip ca. 1.2 mm long, inside concave, lower lip ca. 2.5 mm long, 3-lobed, the middle lobe nearly square, lateral lobes relatively small, oblique broadly ovate; stamens 4, didynamous, glabrous, front pair slightly exserted from the corolla, rear pair included, anthers coherent as pairs, nearly orbicular, diameter ca. 1.2 mm; disc annular,

glabrous; pistil ca. 8 mm long, glabrous, ovary nearly linear, style short. Capsule linear, ca. 2 cm long, glabrous.

The characteristic of this species is its diminutive habit. Other species of Ancylostemon have leaf blades 3.5 cm or more long, calices 3.5 cm or more long, corollas 2 cm or more long (A. lancifolius (Franch.) Burtt has the corolla ca. 11 mm long, but purple, leaf blades to 11 cm long, lanceolate).

Ancylostemon humilis W. T. Wang, sp. nov. [Acta Phytotax. Sin. 13(3): 100, 1975]

Didissandra saxatilis Hemsl. var. microcalyx Hemsl. in Journ. Linn. Soc. Bot. 26: 227 (1890).

Ancylostemon saxatile (Hemsl.) Craib var. microcalyx Hemsl. ex Craib in Not. Bot. Gard. Edinb. 11: 266 (1919).

Species multo humilis a omnibus congenericis adhuc cognotis facile distincta.

Szechuan: Wu-shan, Tang-yang, 2100 m above sea level, on rocks in a forest, flower light yellowish white, 26 July 1958, Yang Kuang-hui 59063 (Holotypus).

Hupei: Pa-tung, 2100 m above sea level, on damp calcareous rocks, flowers unopened, 22 July 1957, Ch'uan Kuo-hsun, Chang Chih-sung 960.

The genus Ancylostemon is endemic to the southwestern part of this country, with ca. 8 species. W. G. Craib in 1919 described this genus and included a key to the species² (see the aforementioned paper, page 266), and in 1954, B. L. Burtt and R. Davidson made additions⁶. Below is given the latter key translated and with additions.

1. Corollas purple (W Szechuan)
 THE PURPLE-FLOWERED
 ANCYLOSTEMON -- A. lancifolius (Franch.) Burtt
1. Corollas orange-yellow, a few yellowish white.

⁶B. L. Burtt & R. Davidson, Studies in the Gesneriaceae of the Old World, V: Notes on Ancylostemon, Not. Bot. Gard. Edinb. 21: 215-216 (1954).

2. Scape and petioles with dense tan tomentose indument (Kweichow)
 THE KWEICHOW ANCYLOSTEMON
 -- A. notochlaenus (Lévl. et Vant.) Craib
2. Scape and petioles with patent brown bristly indument.
3. Ovary densely puberulent (E Szechuan, W Hupei, S Shensi)
 ... ANCYLOSTEMON -- A. saxatilis (Hemsl.) Craib
3. Ovary glabrous or with a few hairs scattered.
4. Calyx at time of flowering not over 7 mm long.
5. Leaf blades to 2.2 cm long, to 1.2 cm broad, margin evenly crenulate, petioles to 3.6 cm long; calyx ca. 2 mm long, 5 lobes divided to near the base; corolla yellowish white, ca. 1.1 cm long; pistil ca. 8 mm long (E Szechuan, W Hupei)
 THE LOW
 ANCYLOSTEMON -- A. humilis W. T. Wang
5. Leaf blades to 14 cm long, to 7.5 cm broad, margin with uneven coarse teeth, some teeth appearing as small lobes, petioles to 9 cm long; calyx 3.5-7 mm long, 5 lobes divided to near the middle; corolla orange yellow, 2.2-2.6 cm long; pistil ca. 1.4 cm long.
6. Leaves membranous, adaxial side with white short hairs and some brown bristly hairs, abaxial side between the bristly veins with sparse extremely short white hairs; seeds 1 mm long (NW Yunnan) THE
 CONVEX ANCYLOSTEMON -- A. convexus Craib
6. Leaves chartaceous, adaxial side with dense relatively long white hair, and also some brown bristly hairs, abaxial side also with dense white hairs between the bristly veins; seeds 0.5 mm long (N Yunnan) THE NORTH-YUNNAN
 ANCYLOSTEMON -- A. mairei (Lévl.) Craib
4. Calyx at time of flowering ca. 1 cm long.
7. Corolla outside puberulent (W Yunnan)
 THE CONCAVE
 ANCYLOSTEMON -- A. aureus (Franch.) Burt

7. Corolla outside with long bristly hairs
(Yunnan in the area of Ping-ch'uan).
8. Corolla twice as long as calyx, dorsal
side not inflated THE FOX-HAIR ANCY-
LOSTEMON - A. vulpinus Burt et Davidson
8. Corolla four times* as long as calyx,
upper part of dorsal side inflated
.....THE HAIRY-FLOWERED ANCYLOSTEMON
-- A. trichanthus Burt et Davidson

THE STONE-MOUNTAIN GESNERIAD GENUS --
Petrocodon Hance

THE TOOTHED-MARGINED PETROCODON -- P. denticulatus
Plate 15, figure 7

Perennial acaulescent herb; rhizomes to 4 cm long, 4-7 mm thick, with long thin roots. Leaves ca. 7, all borne from the base, long-petiolate; leaf blades oblong or oblong lanceolate, 4.5-11.5 cm long, 1.8- 3.8 cm broad, apex short acuminate or acute, base acute, margin dentate or denticulate, both sides with short appressed hairs, lateral veins 3-5 and opposite, with the midveins curving obliquely upward; the petioles 2-6.5 cm long, slightly thick, with dense short appressed hairs. Scapes 1-2, 9-14 cm tall, indument similar to that of the petioles; cymes umbellate, flowers 6-12; bracts linear lanceolate, to 7 mm long; peduncle ca. 6 mm long, with dense patent puberulence; calyx campanulate, ca. 2 mm long, outside with short hairs, 5 lobes some divided to the base, the lobes lanceolate subulate; corolla urceolate, ca. 8 mm long, outside with sparse short hairs, of 5 nearly equal lobes, the lobes triangular or nearly deltate, ca. 1.8 mm long; stamens 2, borne above the base of the corolla tube, glabrous, reaching to the corolla throat, anthers coherent; disk caducous; pistil glabrous.

The genus Petrocodon originally contained only one species, The Petrocodon -- P. dealbatus Hance, distributed in Kwangtung, Kwangsi, Kweichow, and W Hupei, whose leaf margins are entire or with extremely small teeth. P. denticulatus now discovered is extremely close to the former, but can be distin-

*Sic; three times according to Burt et Davidson.

guished by the leaf margins that are dentate or denticulate.

Petrocodon denticulatus W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(3): 101, 1975]

Proximus P. dealbato Hance, specie typicae huius generis monotypici adhuc cognoti, a quo foliis dentatis denticulatisve differt.

Hunan: Ch'ien-yang, Anhuei-Chekianq Agricultural School 60; same place, Hsueh-feng Mt., 9 September 1953, Anhuei-Chekianq Agricultural School 407 (Holotypus).

THE REAR-BUDDED GESNERIAD GENUS--

Opitandra* Burt

THE LUNG-SHENG OPITHANDRA -- O. lungshengensis Plate 15, figure 8

Perennial acaulescent herb. Leaves 7-9, all borne from the base; leaf blades elliptic ovate or ovate, 4.2-7 cm long, 3-4.8 cm broad, apex apiculate or somewhat obtuse, base shallowly cordate, margin shallowly crenate, adaxial side with a somewhat dense white indument, 1.5-3.2 mm long articulated pubescence, abaxial side puberulent, lateral veins 5-6 and opposite; the petioles 1-3 cm long, with dense white puberulence. Scapes 1-3, 5.7-8 cm tall, with spreading villous indument; cyme umbellate, of 2-4 flowers; bracts linear lanceolate, ca. 8 mm long, with a dense white pubescence; the pedicels 7-11 mm long, with a patent pubescence; calyx ca. 7 mm long, outside with a dense pubescence, 5 lobes divided to the base, the lobes linear lanceolate; corolla whitish red, narrowly funnelform, ca. 3 cm long, outside sparsely puberulent, limb bilabiate, upper lip ca. 7.5 mm long, of 2 shallow lobes, the lobes rounded ovate, lower lip ca. 11 mm long, 3 lobes, the middle lobe largest, broadly ovate; stamens 2, borne slightly above the middle of the back of the corolla tube, elongating to the corolla mouth, filaments puberulent, anthers coherent, glabrous; staminodes 2, narrowly linear, ca. 5.5 mm long; disk annular, ca. 1.2 mm tall, glabrous; pistil slightly longer than the stamens, ca. 2.5 cm long, ovary ca. 1.3 cm long,

*Sic; usual spelling is *Opithandra*.

upper part and the style sparsely puberulent, stigma 2-lobed, the lobes broadly ovate, ca. 1 mm long.

This species is close to the Swatow *Opithandra* -- *O. dalzielii* (W. W. Sm.) Burtt, but the leaves are relatively small, the adaxial side with white villous indument, abaxial side white pubescent, the bracts relatively small, ovary upper part only and style with extremely sparse short hairs, while the leaf blades of *O. dalzielii* reach to 15 cm long, both sides covered with a tan hirsute indument, bracts 2-3 cm long, and the ovary and style both covered with a dense pubescence.

Opitandra lungshengensis W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(3): 102, 1975]

A *O. dalzielii* (W. W. Smith) Burtt e descr., foliis minoribus supra albo-villosis subtus albo-pubescentibus, bracteis minoribus, ovario superne tantum cum stylo sparsissime puberulo differt.

Kwangsi: Lung-sheng, P'ing-shui district, T'ao-p'u village, 800 m above sea level, below a thin forest, flowers whitish red, 14 October 1955,
Kwangsi-Kwangtung-Fukien Forest Investigation Expedition 1059 (Holotypus).

B. L. Burtt in 1956 used the plant formerly known as *Oreocharis primuloides* (Miq.) Clarke endemic in Japan to establish the then monospecific genus *Opitandra* Burtt⁷. Two years later, in 1958, he placed several gesneriads endemic in China in this genus⁸. The genus *Opithandra* is extremely close to *Chirita* D. Don and *Didymocarpus* Wall., the important differences are, in this genus the rear 2 stamens are fertile, the front 2 stamens are sterile, while in the other two genera the rear 2 stamens are sterile, and the front 2 stamens are fertile. This genus has about 6 species, of which 5 species are distributed in this country in the three provinces of Kwangsi, Kwangtung and Szechuan, and 1 species distributed in Japan. Below is a key listing all the species of this genus found in this country, translated from B. L. Burtt's key of 1958 (p. 302), with additions.

⁷B. L. Burtt, An independent genus for *Oreocharis primuloides*, Baileya 4: 160-162 (1956).

⁸_____, Studies in the Gesneriaceae of the Old World, XII: *Opitandra*, a genus with sterile anticous stamens, Not. Bot. Gard. Edinb. 22: 301-303 (1958).

1. Petioles and leaf blades abaxial sides both with tomentose indument (SE Kwangsi) THE TOMENTOSE OPITHANDRA -- O. sinohenryi (Chun) Burtt (Didymocarpus sino henryi Chun)
1. Petioles and leaf blades pubescent.
 2. Leaf blades corrugate-bullate* (Szechuan) THE WRINKLED-LEAVED OPITHANDRA -- O. fargesii (Franch.) Burtt (Rottlera fargesii Franch.)
 2. Leaves smooth.
 3. Corolla ca. 1 cm long; pistil exserted from the corolla (Kwangsi) THE SMALL-FLOWERED OPITHANDRA - O. acaulis (Merr.) Burtt (Chirita acaulis Merr.)
 3. Corolla 3-3.5 cm long; pistil included within the corolla.
 4. Scapes and leaves with white pubescence; bracts ca. 8 mm long; corolla ca. 3 cm long; ovary upper part only and the style with a few hairs (N Kwangsi) THE LUNG-SHENG OPITHANDRA - O. lungshengensis W. T. Wang
 4. Scape and leaves with tan hirsute indument; bracts 20-30 mm long; corolla ca. 3.5 cm long; ovary and style both with a dense pubescence (E Kwangtung) THE SWATOW OPITHANDRA - O. dalzielii (W. W. Sm.) Burtt (Chirita dalzielii W. W. Sm.)

THE LIPPED-STYLE GESNERIAD GENUS --

Chirita D. Don

THE WINGED-LOBED CHIRITA -- C. pinnatifida

Chirita pinnatifida (Hand.-Mazz.) Burtt in Not. Bot. Gard. Edinb. 23: 99 (1960); Iconographia Cormophytorum Sinicorum 4: 137, figure 5688 (1975).

Didymocarpus pinnatifidus Hand.-Mazz. in Sinensia 5: 8 (1934).

Chirita quercifolia Wood in Not. Bot. Gard. Edinb. 31: 369 (1972) et 33: 144 (1974), syn. nov.

*Burtt: verrucose-bullate.

Kwangtung: Lien-nan, 820 m above sea level, T'an P'ei-hsiang [P. C. Tang] 58918; Yang Shan, Teng Liang 341.

Kwangsi: Jung-shui, Ch'en Shao-ch'ing 16183; Tzu-yuan, Chung Chi-hsin 83461; Hsiang-chou county, Huang Chih 40038; Ling-yun, T'ai Jen-ch'ang 6988 (isotype of Didymocarpus pinnatifidus Hand.-Mazz.).

Kweichow: Jung R., 920-1300 m above sea level, Chien Chuo-p'o et al. 51486, 51814, South Kweichow Expedition 3170.

Hunan: Yi-chang, 1200 m above sea level, Ch'en Shao-ch'ing 2762.

Kiangsi: Shang-yu, 800 m above sea level, Kiangsi Expedition 71-413.

Fukien: Sui-an, Huang-kang Mt., 1100 m above sea level, Chien Chuo-p'o et al. 400931.

Chekiang: T'ai-shun, Chang Shao-yao 3710.

This species is distributed in this country in the above listed provinces, its leaves are all borne from the base, calyx of five lobes divided to near the base, the lobes often denticulate and close to the Locust-seven* Chirita -- C. fimbrisejala Hand.-Mazz. and other species, but it can be easily distinguished by the leaves shallowly-pinnately lobed, which is its only distinguishing characteristic.

Recently Comrade Wu Cheng-yi discovered that Chirita quercifolia Wood (see above reorganization) described in 1972 by D. Wood on the basis of a specimen from Kwangsi should be classified with C. pinnatifida (Hand.-Mazz.) Burtt, and this writer agrees with his opinion.

THE YUNNAN-SZETCHUAN CHIRITA -- C. forrestii

Chirita forrestii Anthony in Not. Bot. Gard. Edinb. 18: 192 (1934).

var. forrestii

Yunnan: Chung-tien, Pai-ti, G. Forrest 20564 (Isosyntypus!).

Szechuan: Mu-li, 2650 m above sea level, Yü Teh-chün [Yü Te-tsun] 14160; Lang-ta, 2300 m above sea level, Feng Kuo-mei 2753.

Distribution: NW Yunnan, SW Szechuan.

*Exact meaning unclear.

THE ACUTELY-DENTATE VARIETY -- var. acutidentata
Plate 16, figure 10.

The type variety's leaf margins have relatively small obtuse teeth, differing from this variety's leaf margin's triangular and relatively large acute teeth.

var. acutidentata W. T. Wang, var. nov. [Acta Phytotax. Sin. 13(3): 103, 1975]

A var. forrestii foliis margine acute majusque dentatis differt.

Szechuan: T'ien-ch'uan, Erh-lang Mt., Chiu-t'iao ridge, 1900 m above sea level, flower light purple, 27 July 1953, Chiang Hsing-hsing 35070 (Holotypus); unspecified place, Ch'ü K'uei-ling 6215.

THE LONG-PEDUNCLED CHIRITA -- C. longipedunculata
Plate 16, figure 9

Small half-shrub. Stems to 36 cm long, basal diameter ca. 5 mm, not branched, upper part puberulent, lower part becoming glabrous. Leaves opposite; leaf blades oblong or oblong lanceolate, slightly unequal, 11-20 cm long (including petiole 0.9-3 cm), 3.2-5.2 cm broad, apex sharply acuminate, base cuneate, margin denticulate, both sides with somewhat dense and closely appressed puberulence, lateral veins 7-9 and opposite, arching upwardly. Cymes on long peduncles, of ca. 4 flowers, with slightly dense patent puberulence; peduncles 6-8 cm long; bracts linear, ca. 3 mm long; the calyx campanulate, ca. 6.5 mm long, outside with slightly dense closely appressed puberulence, 5 lobes divided to 1 mm above the base, the lobes narrowly lanceolate; the corolla yellow, tubular funnelform, ca. 2.8 cm long, glabrous, tube ca. 1.4 cm long, limb bilabiate, upper lip ca. 7 mm long, 2-lobed, the lobes rounded ovate, lower lip nearly as long as the tube, 3-lobed, center lobe large, broadly ovate; the stamens 2, borne 1 mm above the basal part of the corolla, ca. 10 mm long, glabrous, anthers coherent, broadly ovate, ca. 1.5 mm long; staminodes 2, narrowly linear, 2.2-3.4 mm long; disk annular, glabrous, shallowly lobed; pistil ca. 1.1 cm long, glabrous, ovary elongate oblong, style slightly shorter than the ovary, stigma 2-lobed, the lobes broadly ovate.

This species is close to Chirita kurzii Clarke (distributed in Nepal, Sikkim), but in that the bracts are linear, relatively short, the calyx also relatively short, pistil glabrous, stigma obviously 2-lobed, while the bracts of C. kurzii Clarke are elliptic, 10 mm long, the calyx 15 mm long, ovary and style completely puberulent, stigma nearly peltate.

Chirita longipedunculata W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(3): 104, 1975]

Similis C. kurzii Clarke e descr., a qua bracteis linearibus brevioribus, calyce brevior, pistillo glabro, stigmate conspicue 2-lobato differt.

Yunnan: P'ing-pien, 1700 m above sea level, on rocky cliffs at the edge of a forest, flower yellow, 15 October 1939, Wang Ch'i-wu 82505 (Holotypus); same place, 1400 m above sea level, 25 September 1939, Wang Ch'i-wu 82106.

THE BIG-TOOTHED CHIRITA -- C. grandidentata Plate 16, figure 11

Perennial herb. Stems 10-25 cm tall, unbranched, with rust-colored villous indument, with 2-3 nodes. Leaves opposite; leaf blades ovate, rounded ovate or reniform, 4.5-10.5 cm long, 4-15 cm broad, apex rotund, base shallowly cordate, margin coarsely toothed (teeth oblique ovate, bearing smaller teeth), adaxial side with dense rust-colored puberulence, abaxial side with random small red spots, marginal veins with rust-colored puberulence, lateral veins 4-6 and opposite; the petioles 0.5-1.0 cm long. Cymes borne above the axil, with a long stalk; the peduncles 4.5-7 cm long, with patent puberulence; the bracts purple, ovate or rounded ovate, 5-8 mm long, margin with sparse marginal hairs, other parts glabrous; the calyx campanulate, ca. 5.5 mm long, glabrous, 5 slightly unequal shallow lobes, the lobes broadly ovate, apex rounded truncate; the corolla purple-red, cylindric, glabrous, tube ca. 18 mm long, diameter at the corolla throat ca. 4 mm, limb bilabiate; stamens 2, borne in the upper part of the corolla tube, glabrous, anthers coherent, elliptic, ca. 1.5 mm long; staminodes 2, filiform, ca. 3 mm long; disk cupulate, glabrous; the pistil ca. 17 mm long, glabrous, ovary narrowly linear, style 2 mm long, stigma 2-lobed.

In this species the leaf teeth are large, lobe-like, bearing smaller teeth which is its important characteristics, by which it can be distinguished from the other *Chirita* of this country.

Chirita grandidentata W. T. Wang, sp. nov.
[*Acta Phytotax. Sin.* 13(3): 104, 1975]

Species nova ab omnibus congenericis sinensibus adhuc notis foliis grosse dentatis, dentibus lobuliformibus denticulatis distinguenda.

Yunnan: Meng-che, 1250 m above sea level, in a mountain valley, in a forest, flower purple-red, June 1936, Wang Ch'i-wu 75354 (Holotypus).

THE LONG-CAPSULED GESNERIAD GENUS --

Didymocarpus Wall.

THE HARBINGER-OF-SPRING DIDYMOCARPUS -- *D. primulinus* Plate 16, figure 12

Perennial acaulescent herb. Leaves 6-7, all borne from the base; the leaf blades deltate or rounded ovate, 1.8-4.6 cm long, 1.6-4 cm broad, apex acuminate, base shallowly cordate or truncate, margin with obscure shallow lobes (the lobes tooth-like, deltate, apex acute, with 1-2 small teeth), sometimes only with blunt teeth, adaxial side with white villous indument, abaxial side with sparse white pubescence, and furthermore, the marginal vein with dense rust-colored villous indument; the petioles 1-4.5 cm long, with dense rust-colored villous indument. Scapes 2-4, 7-12 cm tall, indument similar to that of the petioles; cymes of 1-3 flowers; the bracts narrowly ovate or linear, 3.5-7 mm long; the pedicels 0.9-2.4 cm long, with dense patent pubescence; the calyx oblique campanulate, ca. 7 mm long, outside sparsely puberulent, 5 lobes of which some divided to the base, the lobes somewhat unequal in size, the rear one being the largest, narrowly obovate, ca. 8 mm long, the other 4 linear spatulate, 6-7 mm long; the corolla whitish red (?), glabrous, the tube funnelform, ca. 9 mm long, limb bilabiate, upper lip ca. 5 mm long, 2 shallow lobes, the lobes broadly oblique ovate, lower lip ca. 8 mm long, 3 deep lobes, the lobes oblong, apex blunt; the stamens 2, borne below the corolla throat, filaments 8 mm long, upper part sparsely puberulent, anthers coherent, densely puberulent; staminodes 2, broadly

linear, 0.5-0.8 mm long; disk annular, glabrous; the pistil ca. 1.4 cm long, ovary linear, with dense white puberulence, style short, glabrous, stigma depressed capitate. Capsule slender clavate, 6-8 cm long, slightly falcate-curved, becoming glabrous.

This species is near the Fukien-Kiangsi *Didymocarpus* -- *D. heucherifolius* Hand.-Mazz., but it can be distinguished by the calyx lobes linear spathulate, corolla glabrous, staminodes 2, ovary without glandular hairs; the calyx lobes of *D. heucherifolius* are narrowly ovate, the outside of the corolla with sparse hairs, staminodes caducous, ovary with eglandular hairs.

Didymocarpus primulinus W. T. Wang, sp. nov.
[Acta Phytotax. Sin. 13(3): 105, 1975]

Affinis *D. heucherifolius* Hand.-Mazz., a quo calycis segmentis spathulato-linearibus, corolla glabra, staminoides 2, ovario eglanduloso-puberulo distinguitur.

Hunan: Hsueh-feng Mt., 1954, Li Che-t'ang 1891 (Holotypus), 2392; Ch'ine-yang, 1953, Anhuei-Che-kiang Agricultural School 51.

(Conclusion)

植物学研究所

中国科学院植物研究所

1. *Aeschynanthus austroyunnanensis*
(Wang Ch'i-wu 79443)



2. *A. angustiolongus*
(Yü Teh-chün 20924)



1. *Aeschynanthus austroyunnanensis*
(Wang Ch'i-wu 79443)

2. *A. angustiolongus*
(Yü Teh-chün 20924)

3. *A. lasianthus*
(Peng Kuo-mei 7282)



3. *A. lasianthus*
(Peng Kuo-mei 7282)

4. *A. denticuliger*
(Wang Ch'i-wu 85615)

植物志 17 卷

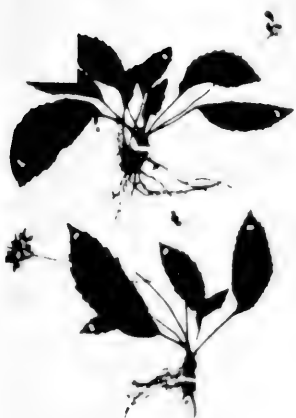
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5. Lysionotus kwangsiensis
(Ch'en Shao-ch'ing 15021)



6. Ancylostemon humilis
(Yang Kuang-hui 59063)



7. Petrocodon denticulatus
(Anhui-Chekiang Agricultural
School 407)



8. Opitandra lungshengensis
(Kwangtung-Kwangsi-Fukien
Expedition 1059)



9. Chirita longipedunculata
(Wang Ch'i-wu 82505)



10. C. forrestii var. acutidentata
(Chiang Hsing-hsing 35070)



11. C. grandidentata
(Wang Ch'i-wu 75354)



12. Didymocarpus primulinus
(Anhui-Chekiang Agricultural
School 51)

THE PEDIASTRUM OF THE
UPPER HACKENSACK RIVER ESTUARY

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Pediastrum is a ubiquitous, colonial planktonic green alga. Although Pediastrum spp. are freshwater organisms, they are able to withstand the salinity of the Hackensack River environment. A previous study has determined that the salinity of the river fluctuates between 40 and approximately 4000 ppm chloride at this study's collection site (Hazen and Isquith, 1975).

Biweekly samples were made from a footbridge on the Teaneck-Hackensack campus of Fairleigh Dickinson University from August, 1975 to July, 1976. Five species of Pediastrum were found during this period: P. simplex var. duodenarium (Bailey) Rabenhorst, P. boryanum (Turpin) Meneghini, P. tetras var. tetraodon (Corda) Hansgirg, P. duplex var. clathratum (A. Braun) Langerheim, P. duplex var. gracillimum W. & G.S. West. Identifications were confirmed using a number of sources including Bourelly (1968), Collins (1928), Pascher (1913), Smith (1920) and Whitford and Schumacker (1973).

P. simplex var. duodenarium (Bailey) Rabenhorst

Coenobia of 16 or 32 cells found with one tapering spine projecting from the marginal cells and large, often irregular, spaces between the cells.

A most abundant species in the Hackensack River and the only species collected during February, 1976.

P. boryanum (Turpin) Meneghini

Coenobia entire without perforations. Marginal cells have two projections but inner cells do not vary markedly from them.

This species was collected in low numbers August, September and October, 1975 and June and July, 1976.

P. tetras var. tetraodon (Corda) Hansgirg

This species is characterized by very regular coenobia in a 7 + 1 arrangement. All cells have a deep cleft.

A very rare form, it was collected in low numbers in August and September, 1975 and July, 1976.

P. duplex var. clathratum (A. Braun) Langerheim

Coenobia had 8-64 cells with very small perforations between them. The marginal cells often bore a hyaline seta.

An extremely plentiful species, it was collected every month except February, 1976 often in numbers greater than P. simplex, the other abundant species.

P. duplex var. gracillimum W. & G.S. West

This variety is distinguished by large coenobial perforations and very slender cells. The marginal cells have slightly convex sides.

This alga was collected on a few occasions. Smith (1920) noted that it is difficult to distinguish variety gracillimum from variety clathratum and that the two often intergrade.

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Myriophyllum spicatum L. along shores of
Gulf of Mexico

Clyde F. Reed

In 1977 the author published an extensive account of the history and distribution of Eurasian watermilfoil, Myriophyllum spicatum L., in the United States and Canada. During the summer and autumn of 1979 an extensive survey was made of the ports and shore lines along the Gulf of Mexico from Panama City, Florida to New Orleans, south to Brownsville, Texas by the author. A few new localities for this watermilfoil were observed at that time.

A brief discussion of the history and presence of Eurasian watermilfoil in North America might be of interest here. Myriophyllum spicatum L. was described by Linnaeus in 1753 from quiet waters from Europe. As early as 1848 Asa Gray listed it from Northern United States; Tatnall in 1860 suggested M. spicatum probably could be found in New Castle County, Delaware, without any definite cited record. Again, Gray in 1867, 1880 and 1887, in various editions of Gray's Manual, listed M. spicatum for northeastern United States, this last time stating it as the first to cite definite specimens from the Potomac River, near Alexandria and Hunting Creek. Hitchcock in 1919 noted the Virginia specimens in the Potomac River (although the river to the Virginia shore belongs to Maryland) and added 'widely distributed in North America, Europe and Asia'.

Looking mainly at northeastern material, Fernald in 1919 clearly indicated that American plants differed in several aspects from the Eurasian specimens, and named the American material M. exalbescent Fern., without indicating that some of the material could be typical M. spicatum L. Hulten in 1947 regarded M. exalbescent as a subspecies, namely M. spicatum subsp. exalbescent (Fern.) Hulten. Gleason in 1952 notes 'perhaps better subordinated to the Eurasian M. spicatum as var. exalbescent (Fern.) Jeps.

Reed in 1970 was the first to treat both species as being in North America. Since the explosion growth of M. spicatum L. in the Chesapeake Bay, the Potomac River and TVA in the 1950's and 1960's, a great number of specimens have been collected and studied. Reasons for this explosive growth during the late 1950's was discussed in the 1977 paper, and as early as 1962, Reed had stated in the Summary of the 1962 Interagency Research Meeting on Eurasian Watermilfoil that due to the hurricanes and the vast amounts of runoff water from limestone areas, pH, ion-concentrations and other nutrient balances had been upset in the Potomac, Susquehanna (which emptied into the head of Chesapeake Bay) and TVA areas.

Since the mid 1960's the population of M. spicatum L. was wained, but so have the frequency of hurricanes in the areas and the amounts of runoff water coming into Chesapeake Bay. However, every year I have been able to find some plants of M. spicatum in the Chesapeake Bay or along the shores of the lower Potomac River.

However, M. spicatum was on its way south. By 1962 Dexter Haven had found it in nearly every tributary of the Virginia shore of the Potomac River; by 1970 it was well established in marshes and ditches near Back Bay, Princess Anne County (Virginia Beach), Virginia, just back from the Atlantic Ocean; John Steenis reported it in 1962 from Pea Island Refuge on the Outer Banks of North Carolina and Reed found it to be abundant at Currituck, North Carolina in 1968. By 1979 it had become a noxious weed in the waterways of the Albemarle Sound and Pamlico Sound regions of eastern North Carolina.

In 1970 Reed recorded on maps spotty localities for M. spicatum in western Florida (in the Tampa-Sarasota region and from Panama City westward along the Gulf Coast), southwestern Georgia, Louisiana and Texas (Houston area). During my search for noxious weeds in 1979, I found several more localities along the shores of the Gulf of Mexico, this time in Mississippi and Louisiana; annotations for these specimens are given below and specimens are deposited in the Reed Herbarium, unless otherwise noted.

As more botanists are studying the watermilfoils, more specimens of the Eurasian Watermilfoil have been coming to light, and Hitchcock's statement that M. spicatum is widely distributed in North America might be quite true.

Annotated specimens:

Mississippi: Shore of Gulf of Mexico at Bay St. Louis, near Puates Cove, Harrison Co. June 21, 1979. Reed 104578.

Louisiana: Shore of Gulf of Mexico, Rt. 90 at Fort. Pike State Monument, New Orleans Parish. Oct. 24, 1979. Reed 103844.

Pointe Coupe Parish, False River near New Roads. July 1966. John W. Thieret. (Fish & Wildlife, Laurel, Md.).

Reed Herbarium,
10105 Harford Road,
Baltimore, Maryland
21234

ADDITIONAL NOTES ON THE GENUS *NEOSPARTON*. I

Harold N. Moldenke

NEOSPARTON Griseb.

Additional bibliography: Latzina, *Lilloa* 1 [Index 2]: 189. 1937; Mold., *Phytologia* 45: 349--352. 1980.

NEOSPARTON APHYLLUM (Gill. & Hook.) Kuntze, *Rev. Gen. Pl.* 3 (2): 254. 1898.

Synonymy: *Verbena aphylla* Gill. & Hook. in Hook., *Bot. Misc.* 1: 161, pl. 46. 1829. *Neosparton aphyllum* Kuntze apud Thiseit.-Dyer, *Ind. Kew. Suppl.* 2: 123. 1904. *Neosparton aphyllum* (Gill. ex Hook. & Arn.) Kuntze apud Latzina, *Lilloa* 1: 189. 1937. *Neosparton andinum* Kurtz ex Mold., *Prelim. Alph. List Inv. Names* 33, in syn. 1940.

Bibliography: Hook., *Bot. Misc.* 1: 161, pl. 46. 1829; Steud., *Nom. Bot. Phan.*, ed. 2, 2: 749. 1841; D. Dietr., *Syn. Pl.* 3: 601. 1843; Schau. in A. DC., *Prodr.* 11: 545. 1847; C. Gay, *Hist. Fis. Chile Bot.* 5: 20. 1849; Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Miers, *Trans. Linn. Soc. Lond. Bot.* 27: 103. 1871; F. Phil., *Cat. Pl. Vasc. Chil.* 219. 1881; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a), 147. 1894; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 2: 1178. 1895; Kuntze, *Rev. Gen. Pl.* 3 (2): 254. 1898; Thiseit.-Dyer, *Ind. Kew. Suppl.* 2: 123. 1904; Reiche & Phil. in Reiche, *Estud. Crit. Fl. Chil.* 5: 295. 1910; Sanzin, *Anal. Soc. Cient. Argent.* 88: 06, 97, 99, 100, & 134, fig. 1. 1919; Hicken, *Sert. And.* 65. 1922; Stapf, *Ind. Lond.* 4: 373 (1930) and 6: 428. 1931; Junell, *Symb. Bot. Upsal.* 1 (4): 30--31. 1934; Molfino, *Trab. Inst. Bot. Farm. Buenos Aires* 54: 112. 1935; H. S. Marshall, *Kew Bull. Misc. Inf.* 1936: 87. 1936; Latzina, *Lilloa* 1 [Index 2]: 189. 1937; Mold., *Geogr. Distrib. Avicen.* 29. 1939; Mold., *Prelim. Alph. List Inv. Names* 33 & 44. 1940; Mold., *Lilloa* 6: 431--432. 1941; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 42, 43, & 96. 1942; Mold., *Alph. List Inv. Names* 33 & 45. 1942; Mold., *Lilloa* 10: 345. 1944; Covas & Schnack, *Darwiniana* 7: 86 & 89. 1945; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 2: 1178. 1946; Mold., *Alph. List Cit.* 1: 96, 235, & 250. 1946; Mold., *Alph. List Inv. Names Suppl.* 1: 16. 1947; Mold., *Alph. List Cit.* 2: 443, 444, 628, & 629 (1948), 3: 894 (1949), and 4: 1035 & 1128. 1949; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 101, 105, & 191. 1949; Cabrera, *Revist. Mus. La Plata, ser. 2, Bot.* 8 (33): 87--168. 1952; Troncoso, *Darwiniana* 11: 186--192, fig. 12--14. 1957; Burkart, *Excerpt. Bot. A.1:* 444. 1959; Mold., *Résumé* 121, 126, 321, 357, & 463. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 2: 1178. 1960; Rahn, *Bot. Tidsskr.* 56: 123. 1960; Cave, *Ind. Pl. Chromos. Numb.* 2: 63. 1961; Hansen, *Excerpt. Bot. A.3:* 208. 1961; Böcher, Hjerting, & Rahn, *Dansk Bot. Arkiv* 22: 108. 1963; McGinnes in McGinnes, Goldman, & Paylore, *Deserts World* 499. 1968; Bolkhov.,

Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 1, 716. 1969; Heusser, Pollen Spores Chile 62, pl. 59-674. 1971; Mold., Fifth Summ. 1: 192 & 199 (1971) and 2: 573, 652, & 896. 1971; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 2, 716. 1974; Troncoso, Darwiniana 18: 330 & 410. 1974; Hunziker, Kurtziana 9: 141. 1976; Rogerson & Becker, Bull. Torrey Bot. Club 103: 234. 1976; Anon., Biores. Ind. 13 (4): B.191. 1977; Mold., Phytologia 44: 136 & 138 (1979) and 45: 351 & 352. 1980.

Illustrations: Gill. & Hook. in Hook., Bot. Misc. 1: pl. 46. 1829; Sanzin, Anal. Soc. Cient. Argent. 88: 100, fig. 1. 1919; Junell, Symb. Bot. Upsal. 1 (4): pl. 2, fig. 1. 1934; Troncoso Darwiniana 11: 188--190, fig. 12--14. 1957; Heusser, Pollen Spores Chile 62, pl. 59-674. 1971.

Recent collectors and authors describe this species as shrubby, 1.2 m. tall, fragrant, the branches and branchlets very slender, mostly more slender than those of *N. ephedroides*, terete, green, not nigrescent in drying, longitudinally many-striate, glabrous throughout or very obscurely pulverulent, decussate-opposite or whorled, rather stiff and erect or ascending, usually more or less swollen at the nodes, the nodes conspicuously annulate, on larger branches usually marked by a circumferential ridge, bearing a pair of opposite, minute, scale-like structures (morphologically leaves) which are 1 mm. long or less, closely appressed, often minutely ciliolate along the margins; principal internodes 0.7--7 cm. long; inflorescence spicate, axillary, borne singly or in pairs in the axils of the scale-leaves or terminating abbreviated or more or less elongated axillary twigs, these twigs (especially when short) differing in color and texture from the adjacent branchlets, more slender and gray, distinctly grayish-puberulent, mostly becoming dry and breaking off after flowering and fruiting; spikes rather short, 1--3.5 cm. long, 1--1.8 cm. wide during anthesis, very densely many-flowered, sessile or short-pedunculate, the peduncles similar to and merging into the adjacent twig, distinctly and densely white-puberulent; flowers sessile, crowded so densely on the densely white- and short-pubescent rachis that its sympodia are practically obsolete, intensely fragrant; bracts and bractlets obsolete; prophylla minute, one subtending each flower, less than 1 mm. long, stiff, truncate at both ends, ciliolate.

This species is based on *Gillies s.n.*, collected between Los Chacayos and Las Arbolitos, Mendoza, Argentina, on November 2, 1824, and is deposited in the Kew herbarium.

Rahn (1960) was not able to determine exactly the chromosome number in this species, "but in some prophases about 16 bivalents were seen", based on *Böcher, Hjerting, & Rahn 909*, determined by Troncoso. Heusser (1971) describes the pollen, based on "*Fabris, XI-1953, NY*" [= *Fabris 893*], as "Monad, isopolar, radiosymmetric; tricolporate, colpi lengthy, straight, rather narrow, constricted at the equator, pores small, ill-defined, appearing short transverse; largely subprolate, amb triangular or subtriangular; exine ca. 1 mm. in thickness, tectate, verrucate; 34--46 x 34--38 μ ."

Recent collectors have encountered the plant in sandy places at

1100--2000 m. altitude. The corollas are said to have been "blue" on Kuntze 3 and Wilczek 40, "blue to pinkish-white" on Ruiz Leal 9651, "lilac" on Ruiz Leal 6412, and "violet to rose" on Ruiz Leal 2742. Cabrera (1952) refers to the species as a nanophanero-phyte. It has been collected in flower in September and from November to February, and in fruit in January and February. The length of the pistil in relation to the size of the pollen grains is discussed by Covas & Schnack (1945).

Schauer (1847) describes the species as "suffruticosa, ramosissima, ramis flexuosis teretibus striatis omnino aphyllis, spicis terminalibus multifloris, bracteis minutissimis squamaeformibus subrotundis cum calyce pubescentibus...In Andibus Chilensium prope Villa Vicenzia et civit. Platensi prope Mendozam (Gill.). Caules 3--4-pedales. Rami squamulis minutis fuscis deciduis basi subten-si. Spicae pollicares-bipollic. Flores Melliodori. Calyx cylindraceus, angulatus, corolla duplo brevior. Corollae limbus 5-lobus."

Gay (1849) characterizes the species as "ramis flexuosis, teretibus, striatis, omnino aphyllis; spica pubescente" and then describes it further as with "Tallos de tres á cuatro piés, partidos en muchos ramos flexuosos, cilíndricos, opuestos, un tanto agudos, enteramente desprovistos de hojas, pero acompañados en su oríjen de pequeñas estípulas morenas y caducas. Espigas terminales, de pulgada y media de largo, con las flores bastante apretadas y de oler de la miel. Cáliz cilíndrico, pubescente, anguloso, con cinco dientes cortos, adornado de brácteas muy pequeñas, muy cortas y ovalarias. Corola el doble mas larga y tiene su limbo mediano. Se halla en las cordilleras entre Santiago y Mendoza."

Sanzin (1919) affirms that *N. aphyllum* is characteristic of the subandean zone, from 900 to 1500 m. altitude, and encountered it "en los cerros áridos y calcáreos" in Mendoza, citing his no. 994 and Kuntze 1700. Troncoso (1957) gives its natural distribution as "desde el N de Mendoza, hasta Neuquén, noroeste de Río Negro y W de La Pampa", but Hunziker (1976) says "Interesa, en consecuencia, dar a conocer un viejo ejemplar del herbario de Córdoba, que lleva el área hacia el norte, en algo más de 3 grados de latitud, hasta la Provincia de La Rioja", citing Hieronymus & Niederlein 420.

Vernacular names recorded for the species are "barba de tigre" and "retamillo". Kurtz reports that its flower-buds are often eaten from the branches ["abgefressen"] by some wild animals, identity unspecified.

It is of interest to note that the Gillies & Hooker reference in the bibliography (above) is often inaccurately cited as "1830", the titlepage date, but was actually effectively published in 1829 according to Marshall (1936). Also, contrary to Latzina's (1937) claim that the "Botanical Miscellany" was edited by Hooker & Arnott together, it was apparently edited by Hooker alone. Latzina's work is sometimes cited as "Latzina, Index II (1937) 139".

Junell (1934) cites only Gillies s.n. in the Kew herbarium. Troncoso (1957) cites the following collections from Argentina: La Pampa: Monticelli s.n. Mendoza: Boelcke 4018 & 4027; Burkart 14081; Troncoso & Nicora s.n.; Carette 327 & s.n.; Castellanos s.n.; Girth

17; Herb. Ruiz 137; Kuntze 3; Kurtz 3455; Molfino s.n.; Perez Moreau s.n.; Ruiz Leal 2742, 2906, 5399, 6944, & 7132; Sanzin 3110; Semper 631; Soriano 4040; Torres 55. Neuquén: Cabrera 11046; Fabris 893; Hauman s.n.; Roth s.n. Río Negro: O'Donell 1951.

Chilean records for this species in previous literature are based on the Kuntze collection from Paso Cruz, which Troncoso maintains was made on the Mendoza, not Chilean, side of the pass and which Kuntze himself has inscribed "Arg." on the accompanying label.

Material of *N. aphyllum* has been misidentified and distributed in some herbaria as *N. ephedroides* Griseb. On the other hand, the Fabris 2178, distributed as *N. aphyllum*, actually is *Diostea juncea* (Gill. & Hook.) Mold., while Dessauer s.n. [Cerro de la Viscacha, 1875] and Negrete s.n. are *D. scoparia* (Gill. & Hook.) Miers.

Citations: ARGENTINA: Mendoza: Bartlett 19475 (Ca--772438, Mi, W--1904523); Bodenbender 53 [Kurtz 10008; Herb. Osten 13015] (Ug); Burkart 8415 (W--1858300); A. Castellanos s.n. [Herb. Inst. Miguel Lillo 15206; Herb. Mus. Argent. Cienc. Nat. 36868] (E--2198244, N); Gillies s.n. [betw. Chacayos & Las Arbolitos] (K--type, N--isotype, N--photo of type, Z--photo of type); Gussfeldt s.n. [Diamante, Pampa, Jan. '83] (B); Kuntze s.n. [Paso Cruz, 1700 m., I. 92] (B, N, W--701193); Kurtz 7204 (B), 7422 (B); Ruiz Leal 2742 (N), 6412 (N), 6944 (N), 6955 (N), 6970 (N), 7132 (N), 9651 (N), 16434 (Tu--155535), 16975 (Tu--137905); Sanzin s.n. [Herb. Mus. Nac. Hist. Buenos Aires 25/2217] (N); Semper s.n. [Ruiz Leal 10255] (N); Wilczek 40 (Cb, Cb, N). Neuquen: Fabris 893 (N); Haumann s.n. [Zapala, II.1902] (Br).

NEOSPARTON DARWINII Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1144. 1876.

Synonymy: *Neosparton darwinii* Benth. & Hook. f. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 303. 1894. *Lippia darwinii* (B. & H.) Speg., Anal. Soc. Cient. Argent. 55: 242. 1902. *Lippia darwinii* Speg. apud Prain, Ind. Kew. Suppl. 3: 104, in syn. 1908. *Neosparton darwinii* Benth. & Hook. apud Troncoso in Cabrera, Fl. Prov. Buenos Aires 5: 125. 1965.

Bibliography: Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1144. 1876; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 303. 1894; Speg., Anal. Soc. Cient. Argent. 55: 242. 1902; Speg., Nov. Add. Fl. Patag. 2: 65. 1902; Prain, Ind. Kew. Suppl. 3: 104. 1908; Mold., Prelim. List Inv. Names 33. 1940; Mold., Lilloa 6: 432. 1941; Mold., Suppl. List Inv. Names 6 & 12. 1941; Mold., Alph. List Inv. Names 30 & 33. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 43 & 96. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 303. 1946; Mold., Alph. List Cit. 1: 142 & 163 (1946) and 2: 444. 1948; H. N. & A. L. Mold., Pl. Life 2: 55. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 105 & 191. 1949; Troncoso, Darwiniana 11: 177--180, fig. 6 & 7. 1957; Burkart, Excerpt. Bot. A.1: 444. 1959; Mold., Résumé 126, 312, 321, & 463. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 303. 1960; Troncoso in

Cabrera, Fl. Prov. Buenos Aires 5: 124 & 125, fig. 43. 1965; Mold., Fifth Summ. 1: 199 (1971) and 2: 553, 573, & 896. 1971; Troncoso, Darwiniana 18: 330 & 410. 1974.

Illustrations: Troncoso, Darwiniana 11: 178 & 179, fig. 6 & 7. 1957; Troncoso in Cabrera, Fl. Prov. Buenos Aires 5: 124, fig. 43. 1965.

Bentham's original (1876) description of this species is: "typicam [of the genus] e prov. Catamarca non vidimus, sed congener videtur specimen à Darwinio (*N. Darwinii*, nov.) in monte Hermoso juxta Bahía Blanca lectum. Habitus inflorescentia calyx corolla et ovarium omnino conveniunt, specificè differre videtur bracteis late ovatis calycem aequantibus v. subsuperantibus et staminibus e tubo breviter exsertis. Fructus tamen deest." In some previous publications I regarded *N. darwinii* as conspecific with *N. ephedroides*, from which it is virtually impossible to differentiate in the herbarium. It is said to differ from the latter in the characters listed by Bentham. I at one time thought that it might differ in having a very short and included pistil, but this character does not hold for even the type collection. Argentine botanists maintain the two taxa as separate, pointing out (as "evidence") that *N. darwinii* inhabits only an area in the province of Buenos Aires at 50 m. altitude, while *N. ephedroides* inhabits an Andean region in Catamarca, Los Andes, Mendoza, Salta, and Tucumán at 3500 m. altitude.

Troncoso (1965) has given us an amplified description of the lowland form: "Arbusto subáfilo, efedroide, de $\pm 1,50$ m de altura, muy ramoso. Ramas rígidas, erguidas, de ápice generalmente seco, cilíndrico-estriadas. Estrías numerosas (26)--29--34--(35). Hojas reducidas a una escamita o mucrón subtriangular de ápice obtuso, precozmente caducas, la de los vástagos jóvenes algo mayores, de 4--5 mm de longitud, lanceoladas, subcarnosas. Espigas contraídas densas, axilares, subglobosas, opuestas, subsésiles. Flores blancas. Brácteas obovado-cuneadas, caducas, membranáceas, de borde superior irregular, glabras, de 5--5.5 mm de longitud, igualando o superando el cáliz. Cáliz tubuloso, lustroso, glabro, 5-dentado, dientes incurvos, subtriangulares, ciliolados. Corola subactinomorfa, glabra. Drupa globosa, papiráceo-lustrosa, epicarpio membranaceo, fibroso interiormente... Endemico del sudoeste de la Provincia [Buenos Aires], en los médanos costaneros de Coronel Dorrego y Coronel Rosales." She cites Cabrera & Fabris 14910, Darwin 528, and Veretoni s.n.

Bentham has placed a misleading sketch on the holotype specimen giving the appearance of epigyny. He says "Ovarium 2-loculare, loculis 2-ovulatis" and "Monte Hermoso outside Bahía Blanca coast of Patagonia 2 Oct. [1832]". The bracts are quite obvious.

Although binomials published in Bentham & Hooker's "Genera Plantarum" are usually accredited to both authors, it is plainly stated by Bentham in Journ. Linn. Soc. Lond. Bot. 20: 304--308 (1883), in his paper entitled "On the joint and separate work of the authors of Bentham and Hooker's Genera Plantarum", that the section on the *Verbenaceae* was done entirely by Bentham.

As stated above, Charles Darwin's original type (no. 528) came from Monte Hermoso, outside of Bahia Blanca, coast of Patagonia", was collected on October 2, 1832, and is deposited in the Kew herbarium. More recent collectors have found it in flower in November and December.

Citations: ARGENTINA: Buenos Aires: Burkart 25637 (W--2568008, Z); C. Darwin 528 (K--type, N--photo of type, Z--photo of type); Doello-Jurado s.n. [Herb. Mus. Nac. Hist. Nat. 24/1711] (N).

NEOSPARTON EPHEDROIDES Griseb., Abhandl. Gesell. Wiss. Götting.

19: [Pl. Lorentz. 197--198] 245, pl. 2, fig. 6. 1874.

Synonymy: *Neosparton striatum* R. A. Phil., Anal. Mus. Nac. Chile 1: [Cat. Praev. Pl. Itin. Tarap.] 60. 1891. *Neosparton ephedroides* Griseb. apud Kuntze, Rev. Gen. Pl. 3 (2): 254. 1898. *Neosparton ephedroides* Griseb. ex Mold., Alph. List Cit. 3: 690, sphalm. 1949.

Bibliography: Griseb., Abhandl. Gesell. Wiss. Götting. 19: [Pl. Lorentz. 197--198] 245, pl. 2, fig. 6 (1874) and 24: [Symb. Fl. Argent.] 279. 1879; Hieron., Bol. Acad. Nat. Cordoba 4: 407. 1881; R. A. Phil., Anal. Mus. Nac. Chile Bot. 1: [Praev. Pl. Itin. Tarap.] 60. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 303. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 150 & 154, fig. 58 G--K. 1895; Kuntze, Rev. Gen. Pl. 3 (2): 254. 1898; Briq., Ann. Conserv. Jard. Bot. Genève. 4: 22. 1900; Briq. in Chod. & Wilczek, Bull. Herb. Boiss., ser. 2, 2: 543. 1902; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 291. 1903; M. Kunz, Anatom. Untersuch. Verb. 41. 1911; Seckt, Anal. Soc. Cient. Argent. 74: 185. 1912; Sanzin, Anal. Soc. Cient. Argent. 88: 96--100 & 134. 1919; Hauman, Anal. Mus. Nac. Hist. Nat. Buenos Aires 32: 473. 1925; Stapf, Ind. Lond. 4: 373. 1930; Junell, Symb. Bot. Upsal. 1 (4): 30--31, pl. 2, fig. 1. 1934; Latzina, Trab. Inst. Bot. Farm. Buenos Aires 54: 112. 1935; Latzina, Lilloa 1 [Index]: 189. 1937; Mold., Geogr. Distrib. Avicen. 29. 1939; Mold., Prelim. Alph. List Inv. Names 33. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 291. 1941; Mold., Lilloa 6: 432--433. 1941; Mold., Alph. List Inv. Names 33. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 42, 43, & 96. 1942; Mold., Lilloa 8: 427 (1942) and 10: 345. 1944; Mold., Phytologia 2: 107. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 303. 1946; Mold., Alph. List Cit. 1: 95, 97, & 248 (1946), 2: 328, 377, 384, 440, 599, & 600 (1948), 3: 672, 690, 812, 813, 900, 909, & 911 (1949), and 4: 1040, 1056, 1120, 1197, & 1302. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 101, 105, & 191. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 45--46. 1951; Darlington & Wylie, Chromos. Atl., ed. 2, 323. 1956; Cabrera, Revist. Invest. Agric. 11: 331, 368, & 398. 1957; Troncoso, Darwiniana 11: 172--177, pl. 3-5. 1957; Burkart, Excerpt. Bot. A.1: 444. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 291. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 303. 1960; Muñoz Pizarro, Espec. Pl. Descr. Philip. 110. 1960; Rahn, Bot. Tidsskr. 56: 123. 1960; Mold., Phytologia 9: 113 & 114. 1963; Troncoso in Böcher, Hjerting, & Rahn, Dansk Bot. Arkiv 22: 108--

109. 1963; McGinnes in McGinnies, Goldman, & Paylore, *Deserts World* 438 & 490. 1968; Bolkh., Griff, Matvej., & Zakhar., *Chromos. Numb. Flow. Pl.*, imp. 1, 716. 1969; Heusser, *Pollen Spores Chile* 62. 1971; Mold., *Fifth Summ.* 1: 192 & 199 (1971) and 2: 573 & 896. 1971; Bolkh., Griff, Matvej., & Zakhar., *Chromos. Numb. Flow. Pl.*, imp. 2, 716. 1974; Troncoso, *Darwiniana* 18: 328--330 & 410, fig. 7. 1974; Mold., *Phytologia* 45: 352. 1980.

Illustrations: Griseb., *Abhandl. Gesell. Wiss. Gotting.* 19: [Pl. Lorentz.] pl. 2, fig. 6. 1874; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 150, fig. 58 G--K. 1895; Junell, *Symb. Bot. Upsal.* 1 (4): pl. 2, fig. 1. 1934; Troncoso, *Darwiniana* 11: 173--175, fig. 3--5 (1957) and 18: 329, fig. 7. 1974.

A fastigate shrub, 1.5--2.5 m. tall, gray-green, *Ephedra*-like; branches, branchlets, and twigs terete, ascending or erect, green, straight and stiff, longitudinally many-striate, usually glabrous and shiny throughout when mature, the larger branches and branchlets swollen at the nodes, the young growth sometimes with the many longitudinal striations densely white-farinose in the sulcations, the ridges remaining green and smooth, giving a striped appearance, the twigs sharp and spine-like apically, often bending sharply and ascending parallel to the branchlets; nodes conspicuously annulate, almost appearing as though articulate on older branches (but apparently not so, since breaking mostly occurs in the internodes), the annular ring prominent on smaller twigs, sunken between 2 parallel rings on older wood, mostly bearing a pair of decussate-opposite scale-like structures (morphologically leaves); principal internodes 1--9 cm. long; inflorescence spicate, but the spikes so abbreviated and densely many-flowered as to appear glomerate, borne in opposite pairs at the lower nodes of the current season's growth, 1--2 cm. long, very densely many-flowered, sessile, the glabrous rachis only visible after the flowers and fruit have fallen off; bractlets apparently present and subtending the flowers, but soon caducous, broadly elliptic or spatulate, about 5 mm. long and 3 mm. wide, rounded and crenate apically from the widest part, basally cuneate and entire, glabrous; flowers with a peculiar perfume; fruit described as white.

Grisebach's original (1874) description of this species is: "Frutex 6pedalis et ultra, dichotomia ramorum erectorum supra axes abortivos apice pungentes eminens, trunco inferne 2--3'', ramis sub apice acuminato 1'' crassis, internodiis 2--3'' longis, junioribus vernicoso-nitidulis; nodi in annulum margine sphacelatum (foliorum scilicet rudimenta) dilatati; spicae 6--8'' longae, ad basin usque densiflorae; bractee ovato-subrotundae, sphacelato-membranaceae, nodulo dilatato apice truncato-constricto, cui flos inseritur, vix majores; calyx sub anthesi 2'', corolla 4'' longa, haec 'albae'; filamenta anthera paullo longiora; stylus 4'' longus; drupa 'alba', ovali-compressa, calyce inclusa, 3'' longa, 1 1/2'' lata."

The species appears to be based on Lorentz 357 from Catamarca, Argentina, "in deserto Campo del Arenal pr. S. José frequens in arena mobile supra Nacimientos", deposited in the Göttingen her-

barium, where it was photographed by Macbride as his type photograph number 17580. Recent collectors have found the plant growing in huge shifting sand-dunes in dry river courses, at altitudes of 1200--3570 m., flowering from October to February, in fruit in December and April. Jörgensen reports it common on "medanos" in the Andean region. McGinnes (1968) refers to it as a nanophanerophyte. Sanzin (1919) affirms that it is characteristic of the subandean zone, from 900 to 1500 m. altitude.

Rahn (1960) reports the chromosome number as "about 16 bivalents"; Bolkhovskikh and his associates (1969) give it as 32, based on the work of Covas (1950).

Vernacular names recorded for the species include "badre", "barc", "bodre", "chinquillo", "pichanilla", "retamillo", and "retamo".

The corollas are said to have been "white" on Burkart 17534 and Cabrera 8934, "yellow" on Ruiz Leal 9720, "yellowish-rose" on Venturi 6928, and "blue" on Chodat & Wilczek 40 according to Briquet (1900).

The stems and branches are used to cover the roofs of native houses in the area where it grows. Troncoso (1963) says of the species: "In Argentina probably with bicentric distribution. Deviating morphologically in the small southern area at Malargüe... In Chile in the Cordillera at Antofagasta." In her 1974 work she cites Cabrera 8934 from Catamarca. In her 1957 work she cites the following: Catamarca: *Castellanos s.n.*; *Castillón 3346 & s.n.*; *Falcone & Castellanos s.n.*; *Jörgensen 1731*; *Lillo s.n.*; *Lorentz 357, 460, & s.n.*; *Philippi s.n.*; *Sayago 2264*; *Schickendantz 105, 250, & 262*; *Schreiter 6314, 6340, & 7112*; *Vervoorst 730*. Mendoza: *Boelcke 4204*; *Covas s.n.*; *Ruiz Leal 7508 & 7700*. Salta: *Burkart s.n.*; *Castellanos s.n.*; *Spegazzini s.n.* Tucumán: *Castellanos s.n.*; *Cozzo 13*.

She comments that "Los ejemplares de Mendoza presentan a primera vista algunas diferencias morfológicas con los típicos de Catamarca: las ramas laterales con más cortas, de 8--30 cm de long. y de entrenudos más breves (2--8 cm de long.), además el número de estrías es menor (20--23). El ejemplar SI19.948, presenta inflorescencias contraídas axilares, o terminales en ramitas laterales de 2,5--11 cm de long. El estudio de mejor material permitirá determinar si estos caracteres poseen valor varietal."

Heusser (1971) lists *N. ephedroides* from "the high cordillera of the Province of Antofagasta", Chile.

It should be noted that some recent authors cite the Philippi reference in the bibliography (above) as "14: 60. 1891" and the Engler & Prantl (1895) reference as "1897", which is incorrect. The fruits are inaccurately described as "berries" by several collectors, although they are plainly drupes.

Philippi's *Neosparton striatum*, based on Lorentz 197 from 3570 m. altitude at Antofagasta Alta, has in the past been considered to have been collected in Antofagasta, Chile, but Troncoso has shown that the locality designated is actually in the the Province of Los Andes, Argentina -- the type is deposited in the Berlin herbarium, where it was photographed by Macbride as his type

photograph number 17581. It is described by Philippi as follows: "... ramis egregie striatis, haud verrucosis; nodis 'annulo margine sphacelato' nullo circumdati; fructu elongato, tereti. Ad Antofagasta frequens. Frutex orgyalis, sicut *N. ephedroides* Gris.; rami majores basi 4 mm., sub apice 2 1/2 mm. crassi, rami saepe verticillati. In nodis loco foliorum squamae duae oppositae, minimi, latiores quam longae, fuscae, sed nunquam annulus margine sphacelatus conspicitur. Pedunculus communis vix 3 mm. longus, dense squamis rufis, illis ad nodos ramorum sitis simillimis, pariter latioribus quam latis (quas Grisebach bracteas vocat) tectus; bracteae ad originem singulorum florum ad marginem angustissimum reductae. Calyx fere 5 mm. longus, corolla ochroleuca 8 mm. Fructus calyce demum obovato-oblongo, apice clauso, viridi, margine nigrescente inclusus, siccus, 4 mm. longus, vix 2 mm. crassus, castaneus, ideo valde a 'drupa alba, ovali compressa' *N. ephedroidis* distinctus." It would seem that more field study is called for in order to ascertain if this form may not actually be distinct, at least in varietal rank.

Citations: ARGENTINA: Catamarca: *Cabrera* 8934 (N); *Castellanos* s.n. [Herb. Mus. Argent. Cienc. Nat. 30/603] (N, N); *Castillon* 3346 [Herb. Inst. M. Lillo 38000] (N, N); *Jørgensen* 1731 [Herb. Osten 11093] (Cb, E--823756, G, N, N--photo, Ug, W--917968, Z--photo); *Lorentz* 93 (B, N), 357 [Macbride photos 17580] (B--isotype, F--663059--photo of 2 isotypes, K--isotype, Kr--photo of 2 isotypes, N--photo of 2 isotypes, W--photo of 2 isotypes, Z--photo of isotype), 367 (B, N--photo, Z--photo), 460 (B, N, N--photo, Z--photo), s.n. [Laguna Blanca, 1872] (B); *R. A. Philippi* s.n. [Antofagasta, 3570 m.; Herb. Mus. Nac. Hist. Nat. Chile 42500; Macbride photos 17581] (B, F--663060--photo, K, Kr--photo, N, N--photo, N--photo, N--photo, N--photo, Vu, W, W--photo, Z--photo, Z--photo); *Schickendantz* 105 (B, B, Cb, K, N, N--photo, Z--photo), 250 (B), 262 (B); *Schreiter* 6340 [Herb. Inst. M. Lillo 32417] (N), s.n. [XI.1915] (N); *Venturi* 6928 (W--1591499); *Vervoorst* 730 (Bl--97387); *E. W. White* 38 (Bm). Mendoza: *Ellenberg* 4556 (Ld); *Ruiz Leal* 7508 (N), 7700 (N, Tu--155518), 9720 (N, Tu--137897). Salta: *Burkart* 17534 (W--2746855); *Cabrera* 10596 (Vi); *R. E. Fries* s.n. [19.10.48] (S); *Moldenke & Moldenke* 19734 (Ac, B, Bi, Bm, Bs, Ca, Es, F, Fg, Hk, Hw, Ld, Le, Lg, Lm, Lw, Mi, Mm, Mr, Ms, N, N, N, No, Ok, Ot, Rs, S, Sm, Ss, Ss, Ut, Ws, Z); *Roig* 15428 (Es); *C. Skottsberg* s.n. [18/10/1947] (S), s.n. [19/10/1948] (Go). Tucumán: *Schreiter* 7112 [Herb. Inst. M. Lillo 32597] (N, Ug, W--1802560).

NEOSPARTON PATAGONICUM Troncoso, Darwiniana 11: 180--186, fig. 8--11. 1957.

Bibliography: Troncoso, Darwiniana 11: 180--186, fig. 8--11. 1957; *Cabrera*, Bol. Soc. Argent. Bot. 7: 150. 1958; *Burkart*, Excerpt. Bot. A.1: 444. 1959; *Mold.*, Résumé 126 & 463. 1959; *G. Taylor*, Ind. Kew. Suppl. 13: 93. 1966; *Ruiz Leal*, Revist. Facult. Cienc. Agrar. 15: 244 & 245, pl. 3. 1969; *Mold.*, Fifth Summ. 1: 199 (1971) and 2: 896. 1971; Troncoso, Darwiniana 18: 330 & 410. 1974.

Illustrations: Troncoso, Darwiniana 11: 182--185, fig. 8--11. 1957; Ruiz Leal, Revist. Facult. Cienc. Agrar. 15: 244, pl. 3. 1969.

Troncoso (1957) says of this species: "Especie patagónica, localizada en las regiones de Colonia Sarmiento y Puerto Deseado. Habita en lugares arenoso-pedregosos y salitrosos, a orillas de ríos y parece planta.....escasa. El ejemplar de San Julian presenta las siguientes diferencias con los ejemplares típicos procedentes de Chubut: ramas en general más delgadas, de 2--3 mm de diámetro, las de mayor edad hasta 4 mm, hojitas algo más desarrolladas, más anchamente ovales, de 2--7 mm de longitud x 1,5--4 mm de latitud, con breve peciolo delgado, de 0,5--1 mm de longitud x 0,7--1 mm de latitud, cáliz subglabro y lustroso, corola de tubo más breve. En el ejemplar LPS21935, único fructificado (frutos en un sobre), los frutos con le mitad exsertos del cáliz pero todos ellos están atacados y transformados en agallas. La carencia de frutos maduros y sanos y la escasez de material no permite valorar definitivamente esta diferencias."

The species is based on *A. Soriano* 4012, collected at Sarmiento, between km. 131 & 132, on the road to Comodoro Rivadavia, Chubut, Argentina, on December 1, 1949, and is deposited in the San Isidro herbarium. Troncoso (1957) cites also *Grondona* 5808 and *Soriano* 3231 from the same locality and *Ameghino* s.n. [LPS 21935, 21936, 21937, 21938, and 21939] from San Julián, Santa Cruz, originally distributed as *Lippia darwinii* (B. & H.) Spag.

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ADDITIONAL NOTES ON THE GENUS *PARODIANTHUS*. I

Harold N. Moldenke

Additional bibliographic information and herbarium material that has come to me since my original publication on this genus in 1941 is herein summarized. Herbarium acronyms employed are those used in all my papers in the present journal since 1931 and are fully explained in my Fifth Summary 2: 795--801 (1971).

PARODIANTHUS Troncoso

Additional & emended bibliography: Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; Angely, Cat. Estat. Gen. Bot. Fan. 17: 5. 1956; R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; Mold., Phytologia 7: 244--247. 1960; Mold., Biol. Abstr. 36: 719. 1961; Hocking, Excerpt. Bot. A.4: 223. 1962; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 194. 1965; Caro, Kurtziana 2: 217--219. 1965; Hunziker, Kurtziana 2: 220 & Add. 223. 1965; Mold., Phytologia 12: 6. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 835. 1966; Anon., Torrey Bot. Club Ind. Am. Bot. Lit. 3: 308. 1969; Rouleau, Guide Ind. Kew. 140 & 353. 1970; Mold., Fifth Summ. 1: 6, 199, &

423 (1971) and 2: 642, 756, 794, & 897. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 857. 1973; Troncoso, Darwiniana 18: 19--26, fig. 1--3. 1973; Anon., Bol. Soc. Argent. Bot. 15: 484. 1974; "J. S. J.", Biol. Abstr. 58 (7): B.A.S.I.C. E.21 & E. 306. 1974; Mold., Phytologia 28: 441 & 510. 1974; Troncoso, Darwiniana 18: 297, 299, 302, 303, 307, 387, 401--403, 408, & 411, fig. 40. 1974; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Mold., Phytologia 45: 40. 1980.

Troncoso (1974) says that this is a "Género endémico de la Argentina. Habita la provincia fitogeográfica del Monte (La Rioja, Córdoba y San Luis), con dos especies: *P. ilicifolia* (Mold.) Tronc. y *P. capillaris* Tronc." She also notes the presence of "Pubescencia malpighiácea o submalpighiácea en ramas jóvenes y hojas y de pelitos glandulares y 'exocrystalíferos' en pedúnculos y pedicelos." As to its economic importance, she says: "No se le conoce. El ganado, probablemente caprino, lo come, pues las matas se han hallado ramoneadas."

Caro (1965) places the genus in a new tribe, *Parodiantheae* Caro, in the subfamily *Viticoideae*, the characters of which he gives as "Inflorescentia definita, cymae axillares 2 (-3-4)-florae, Flores zygomorphi. Stamina 4, didynama. Ovarium 2-carpellare, 4-loculare, loculis uniovulatis. Ovula pendula. Fructus siccus schizocarpicus; mericarpia 2 bilocularia dispermia."

PARODIANTHUS CAPILLARIS Troncoso, Darwiniana 18: 19--26, fig. 1--3. 1973.

Bibliography: Troncoso, Darwiniana 19: 19--26, fig. 1--3 (1973) and 18: 402, 403, & 411, fig. 40 g & h. 1974; Anon., Bol. Soc. Argent. Bot. 15: 484. 1974; "J. S. J.", Biol. Abstr. 58 (7): B.A.S.I.C. E.306. 1974; Mold., Phytologia 28: 441. 1974.

Illustrations: Troncoso, Darwiniana 18: [20], 22, & 23, fig. 1--3 (1973) and 18: 402, fig. 40 g & h. 1974.

This species is based on *B. Balegno* 353, collected in hedges at San Francisco del Chañar, dept. Sobremonte, Córdoba, Argentina, on December 8, 1944, and is deposited in the herbarium of the Instituto Miguel Lillo. The species differs from *P. ilicifolius* chiefly in its low creeping habit and its linear or filiform leaves. A special type of "exocrystaliferous" hair is described, common to both species and therefore adding to the generic distinction, in which a small linear crystal is present on the tip of the trichome.

Troncoso (1974) gives the distribution of *P. capillaris* as "Noroeste de Córdoba, proxima a las salinas Grandes, aproxima 500 m s.m. Habita en el monte de Sierra baja (chaco-serrano), en suelo suelto, de tipo xerófilo-chaqueño, protegiéndose del ganado hajo matas espinosas, rastreras, de *Opuntia* sp. y *Prosopis campestris*" in a community of *Thritrinax campestris*, *Geoffroea decorticans*, *Prosopis chilensis*, *P. torquata*, *Aspidosperma quebrachoblanco*, *Celtis chichape*, *Atamisquea emarginata*, *Acacia atramentaria*, *Prosopis campestris*, *Cassia aphylla*, *Larrea divaricata*, *Porlieria microphylla*, *Schinus longifolius*, *Maytenus spinosus*, *M. Vitisidaea*, *Condalia microphylla*, *Aloysia gratissima*, *Lycium* sp., *Stipa*

sp., *Sphaeralcea cordobensis*, *Opuntia* sp., *Menodora integrifolia*, *Verbena hookeriana*, *Junellia juniperina*, *Solanum chacoense*, *S. elaeagnifolium*, *Baccharis ulicina*, and *Trichocline incana*. She cites also Burkart 29643 from the same area.

PARODIANTHUS ILICIFOLIUS (Mold.) Troncoso

Bibliography: Junell, Symb. Bot. Upsal. 1 (4): 18. 1934; Mold., Phytologia 1: 97. 1934; Mold., Feddes Repert. Spec. Nov. 39: 47 (1935) and 39: 132, 138--139, 152, & 153. 1936; Mold., Geogr. Distrib. Avicenn. 29. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 54. 1938; Mold., Prelim. Alph. List Inv. Names 14. 1940; Mold., Lilloa 6: 434. 1941; Troncoso, Darwiniana 5: 31--40, fig. 1--3. 1941; Mold., Alph. List Inv. Names 43 & 44. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 43 & 97. 1942; Mold., Lilloa 8: 428 (1942) and 10: 345. 1944; Hill & Salisb., Ind. Kew. Suppl. 10: 233. 1947; H. N. & A. L. Mold., Pl. Life 2: 31 & 75. 1948; Mold., Alph. List Cit. 3: 694 & 903 (1949) and 4: 979 & 980. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 105 & 192. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 178 & 273. 1950; Anon., U. S. Dept. Agr. Bot. Subj. Index 14358. 1958; R. C. Foster, Contrib. Gray Herb. 184: 170. 1958; Mold., Résumé 26, 250, 354, & 464. 1959; Mold., Phytologia 7: 246--247. 1960; Hocking, Excerpt. Bot. A.4: 223. 1962; Caro, Kurtziana 2: 219. 1965; Mold., Fifth Summ. 1: 199 & 423 (1971) and 2: 642 & 897. 1971; Anon., Biol. Abstr. 58 (7): B.A.S.I.C. E.21. 1974; Troncoso, Darwiniana 18: 387, 402, 403, 408, & 411, fig. 40 a--f. 1974.

Illustrations: Troncoso, Darwiniana 5: 33, 36, & 38, fig. 1--3 (1941) and 18: 402, fig. 40 a--f. 1974.

Troncoso (1974) cites Hunziker 13085 & 17313 from Córdoba, Argentina, and Hunziker & Caro 13590 from La Rioja. Caro (1965) cites Hieronymus & Niederlein 139, Hunziker & Caro 13590, and Stuckert 17013 from La Rioja. Troncoso (1974) also mentions Hunziker 13154 and Stuckert 1073 as source material for her illustration of the species, without reference to place of collection.

NOTES ON THE GENUS *SYMPHOREMA*

Harold N. Moldenke

In view of Munir's recent (1966) monograph of this genus, it would be presumptuous of me to continue with the thorough monograph of this genus which I had planned. However, it does seem worthwhile to place on record the bibliographic and other notes which my wife and I have assembled over the past fifty years. Herbarium acronyms herein employed are the same as have been used in all of my papers in the present (and other) journals since 1929 and are fully explained in my Fifth Summary, pages 795--801 (1971). This is the 51st genus thus far treated by me in this

series of papers.

SYMPHOREMA Roxb., Pl. Coast. Coromand. 2: 46, pl. 186. 1798.

Synonymy: *Analectis* Juss. in Jaume St.-Hil., Expos. Fam. Nat. 2: 362. 1805. *Symphorema* Heyne ex Wall., Numer. List [47], no. 1739, in syn. 1829. *Symphorensa* Spr. ex Llanos, Mem. Acad. Cienc. Madrid 3 (4): Nuev. App. 508. 1858. *Szegleewia* Turcz., Bull. Soc. Nat. Mosc. 36 (2): 212--213. 1863 [not *Szegleewia* Turcz., 1858]. *Szeglewia* C. Mull. in Walp., Ann. Bot. Syst. 7: 419. 1868. *Symphyromea* Wangerin, Justs Bot. Jahresber. 50 (1): 237, sphalm. 1930. *Szegleëwia* Turcz. apud Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 1028. 1966. "*Litsaea* sec Blanco" apud Munir, Gard. Bull. Singapore 22: 161, in syn. 1967 [not *Litsaea* Juss., 1973, nor Pers., 1807]. *Analectpis* Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 45, sphalm. 1978. *Symphoroma* Vill., in herb. *Symphorena* F.-Vill., in herb.

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Symphorema is the type genus of the family *Symphoremaceae* Mold. The family name was originally published as *Symphoremacées* by Van Tieghem (1898) - this French vernacular spelling was used also by Dop & Marchetti (1934). The latinized spelling as originally proposed by me (1948) is employed also by Janssonius (1926), Barkley (1949), Gundersen (1950), Lawrence (1951, 1971), Erdtman (1952, 1966), Angely (1956, 1957), DeRoos (1958), Van Steenis-Kruseman (1962), Soukup (1963, 1967, 1976), Van Steenis (1964), Naurois & Roux (1965), Munir (1967), Jeffrey (1969), Duke (1969), Tomlinson & Fawcett (1972), D'Arcy & Keating (1973), Napp-Zinn (1974), El-Gazzar (1974), and Traub (1974). The emended form, "*Symphorema(ta)ceae*" is used by Airy Shaw (1973) and Gibbs (1974), "*Symphoremataceae*" by Bullock (1958), Melchior (1964), Angely (1971), Hegnauer (1973), Winkler (1973), and Thanikaimoni (1976), and the misspellings, "*Symphormaceae*", "*Symphocemaceae*", "*Symphoraceae*" by Swarten (1948, 1949, 1950), "*Symphoricacaea*" by Lawrence (1951), "*Sympharemacae*" by Lombardo (1954), "*Symphoemaceae*" by Swarten (1955), and "*Symphoraceae*" by an anonymous writer (1969).

The group is regarded as a Subfamily "*Symphoremoideae*" by Briquet (1895) and Troncoso (1974) and "*Symphorematoideae*" by Angely (1971) and Hegnauer (1973). Schauer (1847) and Bentham (1876) regarded it as a Subtribe "*Symphoremeae* Meisner" of the Tribe *Viticeae*. Wight (1850) regarded it as a Tribe. Bullock (1958) accredits "*Symphoremataceae*" to Van Tieghem, Journ. de Bot. 12: 359 (1898), but it is written there only in the French vernacular form, "las Symphoremacées". Gundersen (1950), Metcalfe & Chalk (1950), Melchior (1964), Takhtajan (1969), Angely (1971), and Hutchinson (1973) still combine the family with the *Verbenaceae*. Airy Shaw (1966, 1973) gives a good condensed description of the

Symphoremaceae as a separate and distinct family, suggesting that it may be related to the *Plagiopteraceae*. Barkley (1965) follows a more traditional line in classifying it, along with the *Globulariaceae*, *Myoporaceae*, *Selaginaceae*, *Tetrachondraceae*, *Avicenniaceae*, and *Lamiaceae* in his Order 83, *LAMIALES*, while he puts the *Verbenaceae*, along with the *Phrymaceae*, *Cordiaceae*, *Ehretiaceae*, *Chloanthaceae*, *Stilbaceae*, and *Duckeodendraceae*, in Order 61, *VERBENALES*. Hutchinson (1973) also places the *Verbenales* and the *Lamiales* far apart in his classification, the former as the apex of his arborescent line, *Lignosae*, and the other as the apex of his herbaceous line, "*Herbaceae*".

The type species of *Symphorema* is *S. involucreatum* Roxb. The genus *Decadontia* W. Griff., included in the synonymy of *Symphorema* by Benthams (1876), Briquet (1895), Dalla Torre & Harms (1963), and others, is based on *D. coerulescens* W. Griff., a synonym of *Sphenodesme griffithiana* Wight and therefore belongs in the synonymy of *Sphenodesme* Jack. The *Szeglewia* Turcz., referred to in the synonymy (above) is a synonym of *Pterospermum* Schreb. in the *Sterculiaceae*.

It should be noted that Munir (1967) erroneously cites the Meisner (1840) reference to *Symphorema* as "1843", that of Briquet (1895) as "1879" and "1897", and that of Walpers (1845) as "1844". The Endlicher (1838) reference is often cited as "1836--1856", but the page involved here was actually issued in 1838.

The generic name is taken from the Greek, *symphoreo*, meaning to accumulate or unite, because the small individual flowers are gathered together in heads surrounded by a conspicuous involucre of 6 large bracts. The genus consists of 3 known species, ranging from India and Sri Lanka, through Burma and Thailand, to the Philippine Islands and Tanimbar in the Moluccas. They are scandent shrubs or vines, glabrous, stellate-tomentose, or simply pilose; leaves decussate-opposite, entire or sinuate-dentate; cymes pedunculate, capitate, mostly 7-flowered, involucre, paniculate at the ends of the branches, often with a small bract at the base of the peduncle; involucre composed of 6 oblong "bracts" which are foliaceous, often showily colored, accrescent in fruit; the flower head a dichotomous cyme with normally 3 central and 4 lateral flowers, one pair of opposite large (true) bracts supporting the primary, while 2 smaller pairs (bracteoles) support the 2 secondary bifurcations; flowers sessile, small, centrifugal; calyx obovoid or turbinate, at first closed, later shortly 4--8-toothed, somewhat accrescent; corolla small, white, actinomorphic, normally 6--16-merous, its tube cylindric, widened above, the lobes 6--16, imbricate in bud, equal or subequal, narrowly oblong; stamens 6--16, as many as the corolla-lobes, inserted at the apex of the corolla-tube and alternate with its lobes; anthers exserted, ovate, the connective rather thick, the 2 thecae parallel; ovary basally 2-celled or imperfectly 4-celled, apically 1-celled, 4-ovulate, the ovules pendent from the apex of the free central placenta; style filiform, elongate; stigmas shortly bifid, the branches acute; fruit capsular, nearly dry, included by the mature calyx, obovoid or subglobose, by abortion 1-seeded, shallowly 2-sulcate,

indehiscent; seeds erect, the pericarp and testa thin-membranous, appressed to the embryo, the embryo thick-fleshy, conforming to the fruit in size and shape, the base entire, the radicle not prominent, the 2 cotyledons fleshy, often concave within.

Nair & Rehman (1962) describe the pollen-grains as 3-zonicolpate (as in *Sphenodesme*), not 3-zonicolporate with more than one endocolpium per colpium (as in *Congea*).

In connection with the relationship of the *Symphoremaceae* and *Verbenaceae*, Junell's (1934) comments are worth repeating here: "Tribus *Symphoremoideae* und *Avicennioideae*. Diese beiden Tribus werden hier in demselben Umfang wie bei Engler & Prantl genommen. Die erstere Tribus umfasst die Gattungen *Congea*, *Symphorema* und *Sphenodesma*, die letztere nur die Gattung *Avicennia*. Diese Pflanzen weichen von den übrigen Verbenaceen nicht unbeträchtlich ab, und sie sind auch von einigen Forschern aus dieser Familie ausgeschlossen worden. Bocquillon (1862--63, p. 181) betont ausdrücklich, dass sie mit *Verbenaceae* nichts zu tun haben. Ferner veröffentlichte Van Tieghem (1898) unmittelbar nachdem Briquets Bearbeitung der Familie in Engler & Prantl erschienen war, eine Untersuchung über die Anatomie und den Fruchtknotenbau dieser Pflanzen, in der er den Standpunkt vertritt, dass diese Gattungen keine Verbenaceen sind, sondern in einen ganz anderen Teil des Systems einzureihen sind. Van Tieghem stellte daher die beiden Familien *Avicenniaceae* und *Symphoremaceae* auf, welche er zusammen mit *Santalaceae* und mehrerer anderen Familien in seiner 'Ordre des Innucelles' oder *Santaliniées* aufnahm. Seine Hauptgründe für diese Umstellung waren, dass diese Pflanzen zentrale Plazentation hätten, und dass die Samenanlagen weder Integument noch Nuzellus besäßen. Briquet (1900) unterzieht Van Tieghems Untersuchung einer kritischen Erörterung und zeigt, dass sie von geringem Wert ist, und dass sich seine systematischen Schlüsse auf mehrere falsche Auslegungen des Baus der Fruchtknoten und Samenanlagen stützen. Van Tieghems Beschreibungen des Gynäceumsbaus sind ziemlich eingehend; da sie aber nicht von Figuren begleitet sind, ist es schwer, sich eine klare Vorstellung vom Fruchtknotenbau bei den einzelnen Gattungen zu bilden."

The *Litsea* Juss., referred to in the synonymy (above) is a valid genus in the *Lauraceae*.

Fungi reported as attacking *Symphorema* are *Aschersonia philippensis*, *Crossospora symphorematis*, *Meliola symphorematae*, and *M. symphorematis* var. *major*.

The genus is said to be referred to in "Gazateer Bombay 15: 440", but as of now I have not been able to verify this reference.

List of excluded species:

Symphorema grossum Kurz = *Sphenodesme eryciboides* Kurz

Symphorema jackianum Kurz = *Sphenodesme pentandra* Jack

Symphorema microstylis Bedd. = *Sphenodesme ferruginea* (W. Griff.)

Briq.

Symphorema paniculatum Heyne = *Sphenodesme involucreta* (Presl) B. L. Robinson

Symphorema pentandra Jack = *Sphenodesme pentandra* Jack

Symphorema pentandrum Kurz = *Sphenodesme griffithiana* Wight

Symphorema unguiculata Kurz = *Sphenodesme involucrata* (Presl) B. L. Robinson

Symphorema unguiculatum Kurz = *Sphenodesme involucrata* (Presl) B. L. Robinson

Szcegleewia involucrata Turcz. = *Pterospermum obliquum* Blanco
Sterculiaceae

Szcegleëwia Turcz. ("1858" 1973) = *Pterospermum* Schreb., *Sterculiaceae*

Szcegleëwia involuceata Turcz. = *Pterospermum obliquum* Blanco,
Sterculiaceae

The C. B. Robinson 1464, distributed as *Symphorema* sp., is
Sphenodesme griffithiana Wight.

SYMPHOREMA INVOLUCRATUM Roxb., Pl. Coast Coromand. 2: 46, pl.

186. 1798 [not *S. involucratum* "Roxb. sensu Wall.", 1967,
nor Kew, 1972, nor Llanos, 1880, nor Spreng., 1858, nor Wall.,
1895].

Synonymy: *Analectis speciosa* Vahl, Dansk Nat. Selsk. Skriv. 6:
1810. *Lerchea rotundifolia* Hamilt. ex Mold., Fifth Summ. 2: 248,
in syn. 1971. *Sphenodesme larseni* Mold., Fifth Summ. 2: 624, in
syn. 1971.

Bibliography: Roxb., Pl. Coast Coromand. 2: 46, pl. 186. 1798;
Vahl, Dansk Nat. Selsk. Skriv. 6: 94. 1810; Spreng. in L., Syst.
Veg., ed. 16, 2: 208. 1825; Wall., Numer. List [47], no. 1740.
1829; Roxb., Fl. Ind., ed. 2, imp. 1, 2: 262--263. 1832; Wight,
Icon. Pl. Ind. Orient. 2: 5, pl. 362. 1840; Voigt, Hort. Suburb.
Calc. 470. 1845; Walp., Repert. Bot. Syst. 4: 116 & 134. 1845;
Schau. in A. DC., Prodr. 11: 621. 1847; Buek, Gen. Spec. Syn. Can-
doll. 3: 464. 1858; Llanos, Mem. Acad. Cienc. Madrid 3 (4): 507.
1858; W. Ell., Fl. Andhr. 63 & 97. 1859; Dalz. & Gibs., Bomb. Fl.
199. 1861; Thwaites & Hook. f., Enum. Pl. Zeyl., imp. 1, 242.
1861; Roxb., Fl. Ind., ed. 2, imp. 2, 326. 1874; Kurz, Forest Fl.
Brit. Burma 2: 254. 1877; Fern.-Villar in Blanco, Fl. Filip., ed.
3, Nov. App. 162. 1880; Gamble, Man. Indian Timb., ed. 1, 282 &
520. 1881; C. B. Clarke in Hook. f., Fl. Brit. India 4: 599. 1885;
Trimen, Syst. Cat. Flow. Pl. Ceyl. [Journ. Ceyl. Br. Roy. Asiat.
Soc. 9:] 69. 1885; Watt, Dict. Econ. Prod. India 5 (3): 396. 1889;
Baill., Hist. Pl. 11: 89. 1891; Watt, Dict. Econ. Prod. India 6
(3): 396. 1891; Nairne, Flow. Pl. West. India 248--249. 1894; Tal-
bot, Syst. List Trees Shrubs Bomb., ed. 1, 163 & 228. 1894; Briq.
in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 179 & 180,
fig. 67 A--D. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp.
1, 2: 1021. 1895; Trimen, Handb. Fl. Ceyl. 3: 363. 1895; Woodr.,
Journ. Bomb. Nat. Hist. Soc. 12: 360. 1899; Gamble, Man. Indian
Timb., ed. 2, imp. 1, 545. 1902; Prain, Bengal Pl., ed. 1, 837.
1903; Brandis, Indian Trees, imp. 1, 514. 1906; T. Cooke, Fl.
Presid. Bomb., imp. 1, 2: 435. 1906; Solered., Syst. Anat. Dicot.
Ergänz. 254 & 255. 1908; Talbot, Forest Fl. Bomb., ed. 1, 2: 360-
361. 1909; Craib, Kew Bull. Misc. Inf. 9: 445. 1911; J. C. & M.
Willis, Rev. Cat. Flow. Pl. Ceyl. [Perad. Man. Bot. 2:] 69. 1911;
Craib, Contrib. Fl. Siam Dicot. 167. 1912; Gilg in Engl., Syllab.
Pflanzenfam., ed. 7, 314, fig. 413 H & J. (1912) and ed. 8, 318,

fig. 413 H & J. 1919; Gamble, Man. Indian Timb., ed. 2, imp. 2, 545. 1922; Haines, Bot. Bihar Orissa, ed. 1, 4: 724. 1922; Gamble, Fl. Presid. Madras 2 (6): 104. 1924; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 339, fig. 418 H & J. 1924; Stapf, Ind. Lond. 6: 243. 1931; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339, fig. 432 H & J. 1936; Dop in Lecomte, Fl. Gén. Indo-chine 4: 897-898, fig. 93 (2--5). 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 441. 1938; Mold., Suppl. List Comm. Vern. Names 9, 12, 16, & 21. 1940; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 56, 60, & 100. 1942; Mold., Phytologia 2: 113. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 1021. 1946; Razi, Journ. Mysore Univ. 7 (4): 64. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 128--130, 138, & 174. 1949; Talbot, Trees Shrubs, ed. 3, 406. 1949; Erdtman, Pollen Morph. Pl. Tax., ed. 1, 448--449. 1952; T. Cooke, Fl. Presid. Bomb., imp. 2, 2: 515 & 610. 1958; Abeywickrama, Ceyl. Journ. Sci. Biol. 2: 218. 1959; Anon., Kew Bull. Gen. Index 274. 1959; Mold., Résumé 164, 166, 167, 178, 234, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1021. 1960; Nath, Bot. Surv. South. Shan States 305. 1960; Haines, Bot. Bihar Orissa, ed. 2, 2: 759. 1961; Nair & Rehman, Bull. Bot. Gard. Lucknow 76: 22. 1962; Mold., Résumé Suppl. 3: 35. 1962; Mold., Dansk Bot. Arkiv 23: 86. 1963; Prain, Bengal Pl., imp. 2, 2: 625. 1963; Thwaites & Hook. f., Enum. Pl. Zeyl., imp. 2, 242. 1964; Erdtman, Pollen Morph. Pl. Tax., ed. 2, 448--449, fig. 256 H. 1966; Sebastine & Ramamurthy, Bull. Bot. Surv. India 8: 171 & 180. 1966; T. Cooke, Fl. Presid. Bomb., imp. 3, 2: 515 & 610. 1967; Munir, Gard. Bull. Singapore 22: [153]--155, 164--168, & 171, fig. 3, map 2. 1967; Vajravelu & Rathakrishn., Bull. Bot. Surv. India 9: 43. 1967; J. L. Ellis, Bull. Bot. Surv. India 10: 157. 1968; Gunawardena, Gen. Sp. Pl. Zeyl. 148. 1968; Venkatared-di, Bull. Bot. Surv. India 11: 258. 1969; Mold. in Menninger, Flow. Vines 330. 1970; Blasco, Inst. Franç. Pond. Trav. Sect. Scient. Techn. 10: 33, 38, & 423. 1971; Brandis, Indian Trees, imp. 2, 514. 1971; Erdtman, Pollen Morph. Pl. Tax., ed. 1, 448--449. 1971; Mold., Fifth Summ. 1: 278, 281, 284, 298, & 390 (1971) and 2: 548, 624, 844, & 970. 1971; Roxb., Fl. Ind., ed. 2, imp. 3, 2: 326. 1971; Gamble, Man. Indian Timb., ed. 2, imp. 3, 545. 1972; Talbot, Forest Fl. Bombay, ed. 2, 2: 360--361. 1976.

Illustrations: Roxb., Pl. Coast Coromand. 2: pl. 186 (in color). 1798; Wight, Icon. Pl. Ind. Orient. 2: pl. 362. 1840; Baill., Hist. Pl. 11: 89. 1841; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 180, fig. 67 A--D. 1895; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314, fig. 413 H & J. (1912), ed. 8, 318, fig. 413 H & J. (1919), and ed. 9 & 10, 339, fig. 418 H & J. 1924; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339, fig. 432 H & J. 1936; Dop in Lecomte, Fl. Gén. Indo-chine 4: 897, fig. 93 (2--5). 1936; Erdtman, Pollen Morph. Pl. Tax., ed. 2, 449, fig. 256 H. 1966; Munir, Gard. Bull. Singapore 22: 166, fig. 3. 1967.

A large shrubby climber, rampant, often ascending tall trees; stems slender, the younger parts stellate-tomentose; bark thick, gray, corky, vertically deeply furrowed; wood white, soft, porous, the pores large, often subdivided by wedges between the few moder-

ately broad medullary rays; leaves decussate-opposite, often large on the main branches, but often only 0.8--1.6 cm. long on flowering branches; petioles normally about 5 mm. long; leaf-blades ovate or elliptic, 2--6.5 cm. long on non-flowering branches and 4 cm. wide, apically subacute, marginally usually coarsely crenate-serrate, basally rounded, pubescent or villous when young, ultimately nearly glabrous above, remaining pubescent beneath with close white stellate pubescence; peduncles about 2.5 cm. long; bracts lanceolate-oblong, semi-membranous, about 6 mm. long during anthesis, venose, pubescent or villous, in fruit to 3.2 cm. long and 1.5 cm. wide, spatulate-elliptic, thinly pubescent; calyx green, persistent, about 4 mm. long, ribbed, stellate-tomentose, its rim very shortly 6--8-toothed with oval subacute teeth, in fruit 6 mm. long or longer, narrowed upwards; corolla white, about 6 mm. long, the tube short, cylindric, the 6--8 lobes about as long as the limb, linear, apically acute, reflexed; pollen 3-colpate (occasionally 6-rugate or more or less polyrugate), prolate, 49 x 34 μ ; involucre in fruit thin-membranous, prominently reticulate; fruit about 4 mm. long, glabrous.

This plant inhabits monsoon forests in India, dry deciduous forests, the banks of small streams, the edges of semi-evergreen forests, and open evergreen jungles in Burma and Thailand, and has been encountered by recent collectors at altitudes of 100--1330 m., flowering from February to May, fruiting in May and June.

The species is apparently native from western peninsular India, through Burma and Thailand, and south to Sri Lanka. Talbot (1949) gives its distribution as "Western Peninsula from the Konkan southward, Ceylon. Throughout the Konkan and North Kanara in moist forests, common in the forest near Yellápur." Naire (1894) says: "Konkan (Gamble). It appears to be rare [in western India]. D[alzell] had it between Nagotna and Alibag; I at two places in the Rutnagherry collectorate. It has some resemblance to *Getonia floribunda*." Cooke (1906) gives its overall distribution as western peninsular India, Burma, and Sri Lanka. Munir (1967) doubts that it is native in Sri Lanka, having been collected there only once by Rev. S. O. Glenie. Thwaites cites this collection as his C.P. 3645 and comments "very rare" in the "Dry region". Voigt (1845) reports it as cultivated in Calcutta.

Saldanha records *S. involucreatum* as an "occasional woody scandent straggler" in Mysore; Razi (1946) also reports it from Mysore and calls it a chamaephyte according to Raunkiaer's scheme of life-forms. Nath (1960) lists it from the Southern Shan States of Burma. Smitinand reports it "scattered" in Thailand, and Sørensen and his associates describe it there as a "4 m. tall tree", probably meaning that it was climbing in such a tree. Watt (1893) calls it "A large deciduous scandent shrub, frequent in the Western Decan Peninsula from the Konkan southward; also in Burma and Ceylon.. the wood used for fuel". Clarke (1885) cites only *Hamilton s.n.* and gives the species' distribution much the same, adding only "Behar". He notes that the leaves on flowering branches are often only 1/2 -- 2/3 inch long and that "The picture of Roxburgh shows the corolla decidedly too large, which misled Wallich, whom Schauer

followed. Kurz....says this species is 'common all over Ava, Martaban and Pegu' [in Burma] where no one else has found it: it might be suspected that Kurz had mistaken for it some *Sphenodesme*, but he describes the corolla as having 6--8 linear-lanceolate acute lobes, and the leaves as coarsely toothed." Munir (1967) cites numerous Burmese collections, including several from Pegu.

Roxburgh's original (1798) description of *S. involucreatum* is: "Suroodo of the Relingas. A large scandent shrub, a native of forests; casts its leaves during the cold season, but they return with the flowers in February, March, and April. I know of no use made of any part of this shrub, except for fuel." *Sphenodesme larseni* is based on *Sørensen*, *Larsen*, & *Hansen* 861 from Thailand; *Lerchea rotundifolia* is based on *Francis Buchanan Hamilton* 1499 from Madras, deposited in the Edinburgh herbarium, a sheet comprising a mixture of *Symphorema involucreatum* and something else.

Nair & Rehman (1962) describe the pollen of *S. involucreatum* as prolate, 32 x 23 μ (range 28--33 x 21--25 μ), the ectine surface psilate, with a faint L0, and the other characters as seen in *Sphenodesme involucreata* (Presl) B. L. Robinson. Erdtman (1966) describes it as 3-colpate and prolate, the dimensions about 35 x 25 μ . All collectors who describe the color of the corollas give it as "white".

Common and vernacular names recorded for the species are "gubba dara", "gubba dara", "konda tekkali", "nway-sat", "nwe-sat", "nwezat", "sigyi", "suroodo", "surudu", "surudu", "thamaka", and "thamanwe".

Prain (1903) separates *S. involucreatum* from *S. polyandrum* Wight as follows:

Corolla 1/4 inch long, 6--8-lobed.....*S. involucreatum*.

Corolla 1/2 inch long, 12--16-lobed.....*S. polyandrum*.

Sebastine & Ramamurthy (1966) speak of *S. involucreatum* as occurring "sporadically" and cite their no. 16152. Thwaites (1861) cites only C.P.3645 from Sri Lanka. Ellis (1968) cites his no. 23758 from Andhra Pradesh, India. Vaharavelu & Rathakrishnan (1967) cite their no. 23544 from Madras; Venkatareddi (1969) cites Reddi s.n. and reports the species "common in [the] Bushi and Kate Pani Forests."

Clarke (1885), Watt (1893), and Dop (1936) include *Congea paniculata* Wall. in the synonymy of *Symphorema involucreatum*, but this name, instead, is now regarded as belonging in the synonymy of *Sphenodesma involucreata* var. *paniculata* (C. B. Clarke) Munir. Several bibliographic references to *Symphorema involucreatum* are sometimes cited incorrectly in the literature of the species. For instance, the Walpers (1845) reference is cited by Munir as "1844", but pages 1--192 of volume 4 of the Walpers work were not issued until 1845. The Haines (1922) reference is sometimes erroneously cited as "6: 724. 1924", while Munir cites it as being in part "3", but pages 419--752 are actually in part 4 of the work. He also misdates the Briquet (1895) work as "1897". The species is said to be referred to in "Gazateer Bombay 15: 440", but to date I have not been able to verify this reference. The Thwaites & Hooker (1861) work is sometimes erroneously cited as "1839".

Cooke (1906) cites unnumbered collections of Dalzell, Dalzell & Gibson, Law, Stocks, Talbot, and Woodrow from India. Munir (1967) cites the following: INDIA: Andhra Pradesh: Barber 1573; Beddome 39, 6519, 6520, 6521, 6522, 6523, & s.n. Bihar & Orissa: Carter 1507; Fischer & Gage 83; Gamble 13745; Haines 2542 4944; Madden 663. Kerala: Bourdillon 537. Konkan: Stocks & Law s.n. Madhya Pradesh: Collector undetermined s.n.; Duthie 9687. Madras: Cleg-horn s.n.; Perrottet 487; Roxburgh s.n.; Wight 909, 2303, 2586, & 2587. Maharashtra: Dalzell s.n.; Herb. Blatter 6112. Mysore: Fernandes 220; Talbot 52 & s.n. Nagaland: Beddome s.n.. SRI LANKA: Thwaites C.P.3645. BURMA: Aubert & Gage s.n.; Brandis 881; Collect 435; Khalil s.n.; Kingdon-Ward 21976; Kurz 1040, 2392, & 2399; Lace 2794; Parkinson 15773 & 15750; Robertson 316; Rogers 274 & 910. THAILAND: Kerr 991, 2932, & 5234; Larsen & Hansen 861; Smitinand 4169.

Material of *Symphorema involucratum* has been misidentified and distributed in some herbaria as *Sphenodesme* sp.

Citations: INDIA: Andhra Pradesh: Beddome s.n. (Pd). Karnataka: Saldanha 16774 (W--2653630); Talbot s.n. [Yellapore, March 1882] (Pd), s.n. [N. Canara, 10/82] (Pd), s.n. [Yellapore, April 12, 1885] (Pd). Kerala: Santapau 3982 (N). Maharashtra: Stocks, Law, etc. s.n. [Malabar, Concan] (Mu--1063, Pd, S). Tamil Nadu: Hamilton 1499 (Ed); Wight 2303 (Mu--1457, Pd, S), 2586/1837 (Pd), s.n. [Peninsula Ind. Orientalis] (N). SRI LANKA: Glenie s.n. [Thwaites C.P.3645] (Pd). BURMA: Aubert & Gage 5721 (Vt); Dickson 7104 (A); Kingdon-Ward 21796 (Bm); Kurz 1040 (Mu--1780); Meebold 16569 (S, S). THAILAND: Larsen, Larsen, Nielsen, & Santisuk 32148 (Ac, Ld); Smitinany 4169 (Z); Sørensen, Larsen, & Hansen 861 (Cp, Z), 7022 (Mi). LOCALITY OF COLLECTION UNDETERMINED: Collector undetermined s.n. (Cp, N--photo, Z--photo).

SYMPHOREMA LUZONICUM (Blanco) Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 162. 1880.

Synonymy: Balibai Blanco, Fl. Filip., ed. 1, 406--407. 1837. *Litsaea luzonica* Blanco, Fl. Filip., ed. 2, 284. 1845. *Symphorensa involucratum* Spreng. ex Llanos, Mem. Acad. Cienc. Madrid 3 (4): Nuev. App. 508. 1858. *Sczegleewia luzonensis* Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 212. 1863. *Symphorema glabrum* Hassk., Flora 48: 402. 1865. *Symphorema involucratum* Llanos ex Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 162, in syn. 1880 [not *S. involucratum* Roxb., 1798]. *Sczegleewia luzonensis* Turcz. apud Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 160, in syn. 1880. *Symphorema involucratum* Spreng. ex Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: [105]. 1880. *Symphorema* sp. Benth. & Hook. ex Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 162, in syn. 1880. *Sczegleewia luzoniensis* Turcz. ex Vidal, Sin. Fam. Gen. Pl. Le . Filip. [Introd. Fl. For. Filip.] 2: 36, in syn. 1883. *Symphorema luzoniense* Benth & Hook. ex Vidal, Sinop. Atlas 36, pl. 75, fig. F. 1883. *Symphorema luzoniensis* Vidal, Phan. Cuming. Philip. 13 & 135. 1885. *Symphorema luzonicum* Fern.-Villar apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1021. 1895. *Symphorema luzoniense* Vidal apud Jacks. in Hook. f.

& Jacks., Ind. Kew., imp. 1, 2: 1021. 1895. *Symphorema cumingianum* Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 180, nom. nud. 1895. *Sczegleewia luconiensis* Turcz. ex E. D. Merr., Sp. Blanc. 335, in syn. 1918. *Litsea luzonica* Blanco apud E. D. Merr., Sp. Blanc. 335, in syn. 1918. *Symphorema luzonense* Vidal apud Stapf, Ind. Lond. 6: 243. 1931. *Symphorema luzonensis* Turcz. ex Mold., Résumé 344, in syn. 1959. *Symphorema luzoniense* (Turcz.) Benth. & Hook. apud Munir, Gard. Bull. Singapore 22: 162, in syn. 1967. *Symphoroma luzonicum* (Blanco) Vill., in herb. *Symphorena luzonicum* F.-Vill., in herb.

Bibliography: Blanco, Fl. Filip., ed. 1, 406--407 (1837) and ed. 2, 284. 1845; Llanos, Mem. Acad. Cienc. Med. 3 (4): Nuov. App. 508. 1858; Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2): 212--213. 1863; Hassk., Flora 48: 402. 1865; Fern.-Villar in Blanco, Fl. Filip., ed. 3, 104, [105], 108, & 4: Nov. App. 160--162. 1880; Vidal, Sin. Fam. Gen. Pl. Leñ. Filip. [Introd. Fl. For. Filip.] 1: 202 (1883) and 2 [Atlas] 36, pl. 75, fig. F. 1883; Vidal y Soler, Phan. Cuming. Philip. 13 & 135. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 857 & 1021. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 180. 1895; Perkins, Frag. Fl. Philip. 3. 1904; E. D. Merr., Bur. Govt. Lab. Bull. 27: 69. 1905; E. D. Merr., Philip. Journ. Sci. Bot. 1, Suppl. 1: 122. 1906; E. D. Merr., Fl. Manila, imp. 1, 400. 1912; E. D. Merr., Sp. Blanc. 335. 1918; H. J. Lam, Verbenac. Malay. Arch. 330--331 & 368. 1919; H. J. Lam in Lam & Bakh., Journ. Jard. Bot. Buitenz., ser. 3, 3: 99 & xvi. 1921; E. D. Merr., Enum. Philip. Pl. 3: 406. 1923; Junell, Symb. Bot. Upsal. 1 (4): 134 & 138, fig. 210. 1934; Sulit, Makileng Echo 15: 253. 1936; Mold., Suppl. List Comm. Verb. Names 9. 1940; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 62 & 100. 1942; Mold., Phytologia 2: 113. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 857 & 1021. 1946; Mold., Alph. List Inv. Names Suppl. 1: 21. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 142, 144, & 147. 1949; Erdtman, Pollen Morph. Pl. Tax., ed. 1, 449, fig. 256 H. 1952; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14359. 1958; Mold., Résumé 185, 191, 236, 237, 318, 343, 344, 350, 351, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 857 & 1021. 1960; Hansford, Sydowia, ser. 2, Beih. 2: 692 & 693. 1961; Erdtman, Pollen Morph. Pl. Tax., ed. 2, 446, fig. 256 H. 1966; Munir, Gard. Bull. Singapore 22: [153], 154, 156, 161--165, & 171, map 4, fig. 2. 1967; E. D. Merr., Fl. Manila, imp. 2, 400. 1968; Mold. in Menninger, Flow. Vines 330. 1970; Mold., Fifth Summ. 1: 318, 327, & 395 (1971) and 2: 568, 620, 634, & 844. 1971; Mold., Phytologia 45: 277. 1980.

Illustrations: Vidal, Sin. Fam. Gen. Pl. Leñ. Filip. [Introd. Fl. For/ Filip.] 2 [Atlas] pl. 75 F. 1883; Junell, Symb. Bot. Upsal. 1 (4): 134, fig. 210. 1934; Erdtman, Pollen Morph. Pl. Tax., ed. 1, 449, fig. 256 H (1952) and ed. 2, 449, fig. 256 H. 1966; Munir, Gard. Bull. Singapore 22: 162, fig. 2. 1967.

A scandent shrub, stout, glabrous, high-climbing, woody vine, liana, or scrambler, to 20 m. long, sometimes suberect or tree-like and then 3.5 m. tall; stems very much twisted, fluted when old; branchlets more or less tetragonal, gray-tomentose when young,

glabrescent in age; petioles often modified for climbing, about 5 mm. long, gray-tomentose; leaf-blades coriaceous or subcoriaceous, ovate or ovate-oblong, 4.5--9.5 cm. long, 2--4 cm. wide, apically acute or obtusely acuminate, marginally entire, basally subtruncate, glabrous on both surfaces or somewhat hairy on the midrib; secondaries 4 per side, the lowest pair often more prominent and very long; inflorescence very profuse; cymes opposite, rarely paired in the axil of a single bract or borne on a single peduncle; involucre bracts 6, white or becoming pale-lavender, pinkish, or purple, each subtending a single flower (the central terminal flower not subtended by a bract), obovate, softly pubescent on both surfaces, with a distinct midrib and some smaller secondaries arising from it, the first (terminal) pair 2.5--3.5 cm. long and 0.8--1.4 cm. wide, the other (lateral) pairs 1.5--2.1 cm. long and 3.5--10 mm. wide; peduncles 2.5--4 cm. long, gray-tomentose; calyx 7--8 mm. long, externally minutely tomentellous, within with long silvery antrorse hairs, its rim 5- (or 6-) toothed, the teeth short and subequal, or sometimes somewhat 2-lipped with 2 larger and 3 smaller teeth; corolla blue, its tube 6.5--8 mm. long, externally glabrous, more or less villous in the throat, the lobes 6--12, narrow, 3--5 mm. long, 1.5--2 mm. wide, glabrous on the inner surface, softly pubescent outside; stamens 8--16, inserted in the throat of the corolla-tube, about 6 mm. long, exserted; lower part of the filaments often connate in pairs; style slender, about 1.5 cm. long, exserted; stigma shortly bifid, the lobes apically flattened; ovary borne on a short narrow gynophore, glabrous, imperfectly 4-celled and -seeded.

This species is known only from the Philippine Islands and Tanimbar island in the Moluccas of Indonesia. Munir (1967) has designated as neotype *Llanos 69* in the Arnold Arboretum herbarium.

Recent collectors have found the species growing along highways with *Celtis philippinensis*, in primary, *Dipterocarpus*, and deep lowland forests, at altitudes of 5--100 m., flowering from October to April, as well as in June and August, fruiting in February and June. Ahern's collector reports it "common" in the forests of Luzon, where Pancho asserts that it is "one of the most beautiful wild flowers of the Philippine Islands....common along creeks..... and often cultivated." Sulit (1936) also lists it as cultivated in the Philippines. Clemens records it from Santiago island. The "flowers" [corollas?] are said to have been "whitish-violet" on *Baffaga 6*, "blue" on *Pancho 1065* and *Williams 707*, and "purple" on *Borssum 3283* and *Pancho 1892*.

It is worth noting that Lam (1919) gives the date for the original publication of *S. glabrum* as "1835", apparently in error, and on this basis accepts it as the earliest and therefor accepted name for the taxon. Similarly, the Briquet (1895) reference is sometimes mis-cited as "1894" as per an apparently misleading title page. It seems, however, that the entire section on the *Verbenaceae* in this volume was not issued until 1895. The Turczaninow (1863) reference is sometimes mis-cited as "36 (3)".

Szegleewia luçonensis Turcz. is based on *Cuming 13* of the 1839 supplementary distribution, probably deposited in the Kharkov her-

barium.

Erdtman (1966) describes the pollen of *Symphorema luzonicum*, on the basis of Elmer 17467, as "3-colpate (occasionally 6-rugate or more or less polyrugate), prolate, 49 x 34 μ ."

Common and vernacular names recorded for the species are "balabai", "malabulaon", "malascog", "malasiad", "malasiag", "malaskog", "mulaing-baging", "mulaing-baging", "pamaclaquin", "pamulaklakin", and "pamulak-lakin".

Hansford (1961) records the following fungi as attacking *Symphorema luzonicum*: *Meliola premnae* Hansf. and *M. symphorematae* Stev. & Rold., on the basis of Stevens 62 & 74 for the former and Stevens 655 for the latter.

Vidal (1885) cites Cuming 648. Munir (1967) cites the following collections: PHILIPPINE ISLANDS: Busuanga: Weber 1540. Luzon: Abadilla, Philip. Nat. Herb. 35389; Ahern 40; Philip. Bur. Sci. 1172, 4454, 4455, 4456; Philip. Forest Bur. 2654; Amihan PNH. 40320; Baker 3042; Bañaga PNH. 33398; Barnes 343; Borden PFB. 2549; Clemens 18176, PBS. 17534; Cumming 648, s.n.; Ebron PNH. 34236; Edano PNH. 17784, 17797, 17960; Elmer 9418, 17419, 17429, 17467; Felix PFB. 30914; Gregory 81; Hagan PNH. 35488; Holman 53; Llanos 69; Loher 13444, s.n.; Mabanag PNH. 9601; Merrill 1421, 1934, 2075, 2416, Sp. Blanc. 467; Meyer PFB. 2516; Pascual PFB. 28766; Ramos PBS. 27122; Sinclair 9470; Steiner 1011, 1472; Sulit PNH. 8320; Susara PNH. 37313; Tamesis PFB. 11924; Topping PBS. 5228; Vidal 501, 848; Villavicencio PFB. 23654; Whitford 2; Williams 707. Mindoro: Merrill 954. MOLUCCA ISLANDS: Tanimbar: Borssum 3283.

Merrill (1918) cites Gates s.n. [Merrill Sp. Blanc. 46] from Luzon and notes that "this species is common and widely distributed in Luzon at low altitudes."

Material of *Symphorema luzonicum* has been misidentified and distributed in some herbaria as *S. involucreatum* Roxb. On the other hand, the Steiner 504, distributed as *S. luzonicum*, actually is *Congea velutina* Wight.

Citations: PHILIPPINE ISLANDS: Busuanga: C. M. Weber 1546 (Cm, W--712460). Luzon: Ahern's Collector 40 (Mi, W--447327), s.n. [Herb. Philip. Forest Bur. 1172] (N, W--625910), s.n. [Herb. Philip. Forest Bur. 2654] (Bz--23497, N, Po--63519, W--852615); Asuncion s.n. [Gates 5406; Herb. Philip. Col. Agr. 39355] (Ws); Bañaga 6 [Philip. Nat. Herb. 33398] (W--2212453); P. T. Barnes s.n. [Herb. Philip. Forest Bur. 343] (N, W--851021); Borden 19034 (Ca--239600), s.n. [Herb. Philip. Forest Bur. 2549] (Bz--23495, N, W--625650); J. Clemens s.n. [Herb. Philip. Bur. Sci. 17534] (B, Bz--23498); M. K. Clemens 18176 (La, La); M. T. Cruz 225 (Ur); Cumming 648 (N, N); Elmer 17419 (Bi, Bz--23489, Ca--270713, Du--176346, Mi, N, S, Ut--66549, Vi, W--1237083), 17429 (Bi, Bz--23490, Ca--270932, Du--176341, Mi, N, S, Ut--71749, Vi, W--1237093), 17467 (Bi, Bz--23491, Ca--271562, Du--174274, Mi, N, N, S, Ut--71622, Vi, W--1237108); F. C. Gates 6601 (Ka--66827); Gates & Catalan 6660 [Merrill Sp. Blanc. 467] (Bz--23492, N, W--904144); Holman s.n. [April 15, 1911] (Du--66952); Kienholz 340 [Herb. Philip. Bur. Sci. 15322] (Ur); Loher 4454 (W--446890), 4455 (Mu--3955, W--446891), 4456 (Mu--3956, W--446892), 6571 (Bz--23500, Bz--23501, Mu--4208, W--713690), 6582

(Mu--4209), 13444 (Ca--243082, Mu--4366), *s.n.* [Herb. Philip. Forest Bur. 14923] (Bz--23499), *s.n.* [Montalban, January 1903] (W--448249), *s.n.* [Montalban, May 1915] (Ca--229201); *Mabanag s.n.* [Philip. Nat. Herb. 9601] (W--2125858, W--2376132); *E. D. Merrill 1334* (N, W--436305), 1421 (N, W--436386), 2075 (N, W--437025), 2416 (N, W--437374); *R. Meyer s.n.* [Herb. Philip. Forest Bur. 2516] (Bz--23496, N, Po--63521, W--852435); *P. V. Pancho 198* (Ba), 1065 (Ba), 1892 (Ba); *Pascual s.n.* [Herb. Philip. Forest Bur. 28776] (Ca--238965); *Quisumbing 7960* (Mi); *Ramnindo s.n.* [Febr. '13] (S); *M. Ramos s.n.* [E. D. Merrill Philip. Pl. 289] (Mu--4210, Ut--22495, W--1178289), *s.n.* [Herb. Philip. Bur. Sci. 27122] (Bz--23488); *Rothdauscher X.I* (Mu--1659), *s.n.* [Manilla 1879] (Mu--1660); *Tamesis s.n.* [Herb. Philip. Forest Bur. 11924] (Bi); *Topping s.n.* [Herb. Philip. Bur. Sci. 5228] (Bz--23494); *Villavicencio s.n.* [Herb. Philip. Forest Bur. 23654] (W--1294942); *Whitford 2* (N, W--851444); *R. S. Williams 707* (N, Qu, W--707197). Mindoro: *E. D. Merrill 954* (N, W--435927). Palawan: *Bernejos s.n.* [Herb. Philip. Bur. Sci. 233] (Gg--31261), *s.n.* [Dec. 1905] (Bz--23493, N, W--439488). GREATER SUNDA ISLANDS: Java: *Herb. Harvey s.n.* [Java] (Du--166401). MOLUCCA ISLANDS: Tanimbar: *Borssum 3283* [Bisset 718] (Ba).

SYMPHOREMA POLYANDRUM Wight, Icon. Pl. Ind. Orient. 2: 5, pl. 363 [as "*polyandra*"]. 1840; Schau. in A. DC., Prodr. 11: 621. 1847.

Synonymy: *Symphorema involucrata* Roxb. ex Wall., Numer. List [47], no. 1740. 1829. *Symphorema polyandra* Wight, Icon. Pl. Ind. Orient. 2: 5, pl. 363. 1840. *Symphorema involucratum* Kew ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 599, in syn. 1885 [not *S. involucratum* Llanos, 1880, nor Roxb., 1798, nor Spreng., 1858]. *Congea involucratum* Wall. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595, in syn. 1893. *Symphorema involucratum* Wall. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1021, in syn. 1895. *Symphorema involucratum* "Roxb. sensu Wall." apud Munir, Gard. Bull. Singapore 22: 168, in syn. 1967.

Bibliography: Wall., Numer. List [47], no. 1740. 1829; Wight, Icon. Pl. Ind. Orient. 2: 5, pl. 363. 1840; Voigt, Hort. Suburb. Calc. 470. 1845; Schau. in A. DC., Prodr. 11: 621. 1847; Wight, Illust. Ind. Bot. 2: pl. 173 bis. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 464. 1858; Kurz, Forest Fl. Brit. Burma 2: 254--255. 1877; Gamble, Man. Indian Timb., ed. 1, 282 & 520. 1881; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 599--600. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 595. 1893; Nairne, Flow. Pl. West. India 249. 1894; Talbot, Syst. List Trees Shrubs Bomb., ed. 1, 163 & 228. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 180. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1021. 1895; Woodr., Journ. Bomb. Nat. Hist. Soc. 12: 360. 1899; Gamble, Man. Indian Timb., ed. 2, imp. 1, 545. 1902; Prain, Bengal Pl., imp. 1, 837. 1903; Brandis, Indian Trees, imp. 1, 514. 1906; T. Cooke, Fl. Presid. Bombay, imp. 1, 2: 434--435. 1906; Talbot, Forest Fl. Bombay, ed. 1, 2: 360 & 361. 1909; Gamble, Man. Indian Timb., ed. 2, imp. 2, 545. 1922; Haines, Bot.

Bihar Orissa, ed. 1, 4: 724. 1922; Gamble, Fl. Presid. Madras 2 (6): 1104. 1924; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 74, & 100. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 595 (1946) and imp. 2, 2: 1021. 1946; Talbot, Trees Shrubs Bomb., ed. 3, 406. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 128, 163, & 174. 1949; T. Cooke, Fl. Presid. Bombay, imp. 2, 2: 515 & 610. 1958; Mold., R  sum   164, 222, & 439. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 595 (1960) and imp. 3, 2: 1021. 1960; Haines, Bot. Bihar Orissa, ed. 2, 2: 759. 1961; Mold., R  sum   Suppl. 4: 8. 1962; Prain, Bengal Fl., imp. 2, 625. 1963; Munir, Gard. Bull. Singapore 21: 333 & 334 (1966) and 22: [153], 156, & 168--171, map 3, fig. 4. 1967; T. Cooke, Fl. Presid. Bomb., imp. 3, 2: 515 & 610. 1967; Patel, Fl. Melghat 270. 1968; Mold. in Menninger, Flow. Vines 330. 1970; Brandis, Indian Trees, imp. 2, 514. 1971; Malhotra & Moorthy, Bull. Bot. Surv. India 13: 310. 1971; Mold., Fifth Summ. 1: 278 & 369 (1971) and 2: 844. 1971; Gamble, Man. Indian Timb., ed. 2, imp. 3, 545. 1972; Talbot, Forest Fl. Bomb., ed. 2, 2: 360 & 361. 1976; Mold., Phytologia 36: 37 (1977) and 45: 54. 1980.

Illustrations: Wight, Icon. Pl. Ind. Orient. 2: pl. 363. 1840; Wight, Illustr. Ind. Bot. 2: pl. 173 bis. 1850; Munir, Gard. Bull. Singapore 22: 169, fig. 4. 1967.

This species is based on *Wight 2304*, probably collected at Balaghat, Madhya Pradesh, India, and deposited in the Kew herbarium. Talbot (1949) says of the species that it "Takes the place of *S. involucreatum* in the dry zone. A climbing or spreading shrub". He goes on to say that it occurs in the "Hills of the South Deccan peninsula northwards to Belgaum: Belgaum and Dharwar districts in dry open situations, also in deciduous monsoon-forest; a somewhat rare species. Flowers profusely during Feb.--Mch. when it is bare of leaves. Bark grey, shining, lenticellate. Wood grey, soft." Voigt (1845) lists it as cultivated in Calcutta. Prain (1963) refers to it as a "large climber" in Chota Nagpur and Orissa. Patel (1968) calls it "a large scrambling shrub", growing in dry ravines in Bombay.

Nairne (1894) tells us that *S. polyandrum* is like *S. involucreatum* "but larger in all its parts and more hairy; leaves up to 9 inches long." The *Herb. Hort. Bot. Calcut. s.n.* specimen in the Munich herbarium, cited below, exhibits well the large, coarsely dentate leaves normally found on sterile branches. A note appended to the Buitenzorg sheet suggests that the broadly ovate serrate leaves on a separate twig do not belong with the flowers, but it is my belief that they do. They measure 15 cm. in length and 11.5 cm. in width, are basally truncate or subtruncate, apically short-acuminate, coarsely dentate from the apex almost to the base, and densely pubescent beneath, slightly less so above.

Other authors distinguish the two species as follows: In *S. involucreatum* the leaves are thin-textured, entire-margined or only slightly toothed, the flowers are small, about 1/2 inch long, the corolla is 1/4 inch long, 6--8-lobed, the bracts are linear-spatulate, membranous, and the stamens few, 6--9. In *S. polyandrum* the leaves are leathery, marginally deeply repand or toothed, the flow-

ers larger, 1 inch long, the corolla 1/2 inch long, 12--16-lobed, the bracts broadly obovate, and the stamens many, 12--18.

It should be mentioned here that the Wight (1840) reference in the bibliography of this species is often cited as "1840-43", but the page and plate involved here seem actually to have been issued in 1840. Munir (1967) inaccurately cites the Briquet (1895) reference as "1897". He cites the Cooke (1906) reference as "II (1908)" and the Haines (1922) reference as "3 (1922) 728. This Cooke reference is also sometimes cited as "3: 435", the Talbot (1909) reference as "1911", and the Gamble (1924) reference as "2: 1104", the pages in volume 2 being continuous.

Clarke (1885) cites for *S. polyandrum* only "Wight, Beddome, &c". Cooke (1906) cites Ritchie 925, Talbot s.n., and Woodrow s.n. Malhotra & Moorthy (1974) cite their nos. 134917, 134993, 135092, 135264, & 135308. Munir (1967) cites the following collections: INDIA: Andhra Pradesh: Beddome 40, 6512, 6513, 6514, 6515, 6516, 8181, & s.n.; Collector undetermined s.n.; Gamble 10932. Bihar & Orissa: Gamble 9149; Herb. Econ. Pl. Surv. 677; Haines 109. Madhya Pradesh: Wight 2304. Madras: Perrottet 326, 410, & 530. Maharashtra: Ritchie 925 & s.n. Mysore: Talbot 362. Uttar Pradesh: Dowitt 1; Marten s.n.; Ramrao 1370. CULTIVATED: India: Herb. Hort. Bot. Calcutt. s.n.; Kew Distribution 6007; Kurz 56 & s.n.; Wallich 1740.

Citations: INDIA: Madhya Pradesh: Wight s.n. (Pd). Maharashtra: Ritchie s.n. (N). Tamil Nadu: Perrottet 410 (Mu--1185). CULTIVATED: India: Herb. Hort. Bot. Calcutt. s.n. (Pz--23502, Mu--1066, Mu--1167); Kurz 56 (Pd); Voigt s.n. [H. B. Serampore] (Cp, Cp, Cp, Cp, E--photo, N--photo, Z--photo).

NEW COMBINATIONS AND TAXA OF HEPATICAE, I.

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Two major, continuing projects have occupied my attention for over 30 years, The Hepaticae and Anthocerotae of North America [Columbia University Press, Vol. I (1966), II (1969), III (1974), IV (1980; in press)] and "The Hepaticae" for Die Natürlichen Pflanzenfamilien, ed. II. The long time span necessary for completion of these works poses special problems. Thus, in Schuster (1966, pp. 381-86) a new classification of Hepaticae is offered -- with several new taxa proposed. At present (February, 1980), those taxa pertaining to Vols. IV and V of my Columbia University series remain, technically, nomina nuda. However, several have been validated and appear as "Schust. ex" in the works of others. Other taxa proposed have been published, simultaneously, or earlier or later, by other workers. Thus, on p. 382 (Schuster, 1966) the subf. Mytilopsidoideae of the Lepidoziaceae is proposed, technically a synonym of subf. Micropterygioidae Grolle, which appeared slightly earlier. Similarly, on p. 382 the name "Haplochaete Schust." appears which was to be validated in the same volume (p. 724) under the Blepharostomataceae. Between the time corrected page proofs including p. 382 were returned, and the time the signature including p. 724 was returned, a paper by Hodgson appeared describing the same entity as Isophyllaria. Footnote 22, p. 724, was abbreviated and emended, and "Isophyllaria Hodgs." was substituted for "Haplochaete Schust." On p. 385, under the Pelliaceae, subfamilies Verdoornioideae and Allisonioideae are cited as new groups; I intended to discuss and validate these in Vol. IV of this series -- but they appear in Grolle (1972) as "Allisonioideae Schust. subf. n." [to be cited as "ex Grolle"] and in Inoue (1976) as "Verdoorniaceae Inoue" and Allisoniaceae (Schust.) Schust. et Inoue. Other cases could be cited, but I think my point has been made. Long-continued delays in validation of names pose problems both for my work and for that of others. It results in confusion and in duplication of names.

The pragmatic alternative is to validate the names, making new combinations and adjustments in rank where needed, prior to any meaningful discussion of the entities. I have consciously refrained from rushing into print with new names and combinations -- and have seen literally dozens of combinations made in manuscript appear elsewhere. Thus, since I first worked up the Cheilolejeunea clausa-trifaria complex for Vol. IV, and inferentially placed "Euosmolejeunea" trifaria into Cheilolejeunea (1955; Jour. Elisha Mitchell Sci. Soc.), the combination of Cheilolejeunea trifaria has appeared elsewhere -- as well as dozens of other combinations under Cheilolejeunea, which I have had in manuscript since 1955.

For this reason, I publish herein the first series of new taxa and combinations and give only enough comment so that my reasoning is clear to my colleagues; detailed justification for the nomenclatural or taxonomic decisions adopted will appear elsewhere, in their proper and meaningful places.

Family TRICHOCOLEACEAE

Leiomitra mastigophoroides Schust., sp. n. Trichocoleae simile foliis amphigastriques quadrifidis ciliatisque necnon cellulis foliorum papillosis et linearibus ad oblongas, necnon ramificatione libere laterali typi Frullaniae; differens ut (a) gynoecea solum in ramis lateralibus brevissimus atque eorum innovationibus reperta, necnon (b) rami ventrali-terminales interdum adsunt. Type. Dominica: Morne Trois Pitons (RMS 66-751).

Possibly the type species will prove identical to Trichocolea flaccida (Spr.) Jack & Steph. [Leiomitra flaccida Spr., Trans. Proc. Bot. Soc. Edinburgh 15:349, 1885] sensu Fulford (1962), but Spruce describes this species as with "♂ in caulis apice incrassato terminalis." The type of Leiomitra, L. tomentosa (Sw.) Lindb. [Hepaticae, in Hibern., p. 515, 1875], is described by Spruce as with the gynoecea "in caule et ramis paucis superioribus terminales, corymbulum sistentes" -- which fails to fit our species. However, he describes a form of this (Cerro Campana, Peru) as with gynoecea "autem semper ramigenis, nunquam in ipso caule terminalibus" -- which fits our species. L. tomentosa is otherwise very different, and L. mastigophoroides clearly keys to Trichocolea flaccida in Fulford (1962).

In any event, the Mastigophora-like, abbreviated lateral branches to which gynoecea are confined (these gynoeceal branches are followed, on the main axis, with "normal, tapering, simple sterile" branches) are highly distinctive. Gynoecea never occur on main axes; those of short lateral branches either lack innovations entirely or sometimes have a highly abbreviated innovation that almost immediately is again gynoeceal; then 2-3 gynoecea may occur, serially, Taxilejeunea-like, on a single, short, lateral branch.

I describe L. mastigophoroides as a new species even though it will almost surely prove identical to one of the synonyms cited under "Trichocolea flaccida" by Fulford (1962): T. patula Steph., T. inaequalis Steph., T. eggersiana Steph., T. herzogii Steph. However, if the synonymy in Fulford is correct, then L. mastigophoroides cannot be identical to any of these plants, since L. flaccida was described by its author as with gynoecea terminating leading axes ("stems"), rarely on branches. The synonymy in Fulford is poorly established and she states that (even though under "examined material" she lists the types of these purported synonyms) she has not seen the "female inflorescence" of T. flaccida. There is much confusion as to the type of at least two of these synonyms: Stephani (Spec. Hep. 4:57, 1909) cites the type of T. patula Steph.

as from Cordillera de Merida [Venezuela], Fulford states "Dominica: s.l. Eggers." Stephani cites the type of T. eggersiana Steph. (Spec. Hep. 4:59, 1909) as from "Santo Domingo," whereas Fulford cites it also as from Dominica: "s.l., Elliot, type of T. eggersiana," and fails to cite the species at all from Santo Domingo! Only with regard to the types of T. inaequalis Steph. (Spec. Hep. 4: 58, 1909) and T. herzogii Steph. (Biblioth. Bot. 27:230, 1916) do Stephani and Fulford agree.

In my opinion, Leiomitra is fully generically distinct from Trichocolea. With the discovery of a, admittedly single, ventral-terminal, Acromastigum-type branch in Leiomitra mastigophoroides, the position of the Trichocoleaceae is again subject to re-investigation. I once (Schuster, 1959) noted that in numerous ways Temnoma (generally placed into the Blepharostomataceae or Pseudolepicoleaceae) is very similar to Trichocolea (placed in the Trichocoleaceae). Indeed, the presence of a free calyptra + short perianth capping the coelocaul in Leiomitra is exactly as shown for Temnoma (Schuster, 1966, 1967). Hence I think that Leiomitra intimately connects the two families to the point where they must be merged. The following synonymy ensues:

Trichocoleaceae Nakai, in Y. Ogura, Ordines, familiae... a Prof. Nakai... edita, p. 200, 1943 [Tokyo].

Blepharostoma[ta]ceae K. Müll., Sv. Bot. Tidskr. 42:14, 1940 [nom. invalid.]

Pseudolepicoleaceae Fulf. & Tayl., Nova Hedw. 1:411, 1960; new syn.

Herzogiariaceae Fulf., Nova Hedw. 1:397, 1960; new synonymy.

Chaetocoleaceae Fulf., Mem. N.Y. Bot. Gard. 11(1):62, 1962; new syn.

Subf. Temnomoideae Schust., Candollea 21:65, 68, 1967 [under Blepharostomataceae].

Subf. Chaetocoleoideae Schust., Candollea 21:65, 1967 [without Latin diagn.]

Subf. Trichocoleoideae

Subf. Blepharostomatoideae Grolle, Jour. Bryol. 7(2):205, 1972 [under Pseudolepicoleaceae].

The Temnomoideae are here defined as in Schuster (1967, pp. 68-69). The type of Temnoma, T. pulchellum (Hook.) Mitt. has a free shoot calyptra, a perianth developed to a moderate degree, the two arising from a distinct "coelocaul precursor"; cf. Schuster (1967, fig. 24:5). In T. palmatum (Lindb. ex Pears.) Schust., the perianth is more reduced and may not exceed the rather well-developed coelocaul in height (Schuster, 1967, fig. 44:1). It is only a small step to the condition in Leiomitra tomentosa (cf. Hatcher, 1959, fig. 1), and here one goes in an almost imperceptible gradation to the condition in L. lanata (Hook.) Schust., comb. n. [Basionym: Jungermannia lanata Hook., Musci Exot. 2: pl. 116, 1820], in which a low, caplike shoot calyptra and a very low perianth persist. And from there one can derive the perianth- and calyptra-free coelocaul of Trichocolea.

In effect, within Temnoma we find gradation almost to that in Leiomitra of the Trichocoleoideae. In Temnoma, the quadrifid leaf, often with the dorsal 1-2 lobes rather reduced, succubously inserted; the elongated-rectangular leaf cells with roughened cuticle; and the oil-bodies are identical to those in Trichocolea and Leiomitra. We also see opposed paired ciliation, with cilia of similar form (constituted of highly elongated cylindrical cells). The similarity in capsule-wall anatomy between Temnoma and Trichocolea was already commented on by Schuster (1959).

In essence, only two criteria seem to separate the Temnomoideae and Trichocoleoideae: the former has a tendency towards brownish wall pigmentation, the latter consistently lacks it; the former shows plastic branching, with retention (at least sparingly) of ventral-intercalary branches, the latter has evolved specialized, restricted branching modes, usually only Frullania type, with ventral-intercalary branches never present in any taxon I have seen. In view of the great diversity of branching modes from species to species within Temnoma (cf. Schuster, 1967), the last criterion loses significance perceptibly. I would conclude that Temnoma, in most respects, is midway between the other genera of Temnomoideae (in which paired-opposed ciliation never occurs, and in which a coelocaulle-precursor is unknown). The degree of coelocaulle elaboration in the Temnomoideae is highly variable: in Temnoma itself a coelocaulle-precursor seems always distinct: the foot of the sporophyte normally penetrates below the level of insertion of the σ bracts (Schuster, 1967, figs. 24:5, 44:1, 48:1), although in primitive species the perianth is better developed and the coelocaulle less elaborated (as in T. quadripartitum (Hook.) Mitt. and T. quadrifidum (Mitt.) Schust.; cf. Schuster, 1967, figs. 33:1, 30:5). In Archeochaete Schust., Lophochaete Schust., and Pseudolepicolea Fulf. & Tayl. the perianth is well developed and the coelocaulle virtually lacking or a mere precursor (cf. figs. 20:2, 14:4-5, in Schuster, 1967); in these taxa the foot appears never to penetrate below the level of insertion of the uppermost σ bract -- hence one cannot speak of a coelocaulle precursor with bracts inserted on it.

The subf. Blepharostomatoideae is first defined in Schuster (1967, p. 65); it is validly described (under Pseudolepicoleaceae) in Grolle (1972).

The subf. Chaetocoleoideae Schust., subf. n. is also first defined in Schuster (1967, p. 65), but a Latin diagnosis is outstanding. It follows (derived from Spruce, 1885): *Folii succubis, foliolisque palmatifidis, margine integerrimis; bracteis σ exterioribus ciliato-multifidis; perianthio abbreviato, ore longiciliato.* Type (and only) genus. Chaetocolea Spr., Trans. Proc. Bot. Soc. Edinburgh 15:346, 1885.

Family LEPIDOLAENACEAE

The intrageneric classification of this family remains controversial; with the transfer to it of Jubulopsis Schust., the perimeters of the family are visibly broadened. A needed segregate from Lepidolaena itself is the following:

Lepidogyna Schust., gen. n. Differt a Lepidolaena: (1) Coelocaula longissime claviforme; (2) paraphyllia in surculo primario vegetativo praesentia; (3) seta galearum basi bicellulariseriata; (4) capsula longissime elliptica-cylindrica. Type. Jungermannia menziesii Hook., Musci Exot., pl. 118, 1820 [= Lepidogyna menziesii (Hook.) Schust., comb. n.].

Also here is: Lepidolaena hodgsoniae Grolle, Jour. Hattori Bot. Lab. no. 30:29, 1967 = L. hodgsoniae (Grolle) Schust., comb. n.

Lepidolaena has a stoutly obpyriform coelocaula investing a short-ellipsoidal to ovoid capsule; the capsule wall is 3-4-stratose, with the strata of nearly equally thick cells, the inner with I- or U-shaped bands; the spores bear fine, spinulose, or coarse to fine papillae. In Lepidogyna the long-cylindrical coelocaula surrounds a cylindrical-ellipsoidal capsule; its wall is 6-7-layered; the high epidermal cells have evenly thickened radial walls, but inner cells are very delicate and lack distinct thickening bands; spores are covered with irregular, low, often furcate ridges and never bear papillae of any type. The ecology of the two genera is also drastically different.

Capsule-wall anatomy of Lepidogyna is closer to that of Neotrichocolea and Trichocoleopsis, which Inoue would place (on the basis of capsule-wall anatomy) into a family distinct from the Lepidolaenaceae. These and other facts may necessitate a reorientation of family limits; I think either the Jubulopsidoideae must be raised to family rank, or the Neotrichocoleaceae reduced to subfamily rank! A detailed generic revision of this family, with adequate illustrations, will be presented shortly.

Family LEPIDOZIAEAE

Telaranea Spr. ex Schiffn.

Telaranea wallichiana (Gott.) Schust., comb. n. Basionym: Lepidozia wallichiana Gottsche, in G. L. & N., Syn. Hep., p. 204, 1845.

I have collected this east Asiatic taxon in Japan (1974); it is indubitably a member of Telaranea subg. Neolepidozia (Fulf. & Tayl.) Schust., as the symmetric leaves, leptodermous cells, and conspicuous hyaloderm demonstrate.

Lembidium Mitt.

I have shown (Schuster, 1963a) that of all the taxa referred to Lembidium, only L. nutans Mitt. can remain there; others go into Isolembidium Schust., Hygrolembidium Schust., Kurzia subg. Dendrolembidium (Herz.) Grolle, Megalembidium Schust., Chloranthelia

Schust., and Micropterygium Lindenb.! The sole extant species, L. nutans Mitt. is known only from New Zealand; from there, now, a second species can be recognized:

L. longifolium Schust., sp. n. Species L. nutanti cognata, distincta, autem, ut folia elongata, apices 4-lobuli, lobii angusti parvique caduci; cellulae basales foliorum satis amplificatae, non inflatae, cuticula papillosa sicut in reliqua lamina; ramificatio serialis frequens, typi Bazzaniae (typi Frullaniae semper ex eodem latere axis principalis lateraliter summoti enascens; ramificatio ita superficialiter furcata). Type. New Zealand. North Island: Mt. Hauturu, Little Barrier I., 1700-1900 feet (RMS 51443).

This species has a Bazzania-type disposition of the Frullania-type terminal branches: all branches issue only from one side of the leading axis. In L. nutans terminal branches are rare, solitary. Branching suggests that Lembidium s. str. is very different from Isolembidium Schust., Megalembidium Schust. (with Frullania- and Microlepidozia-type terminal branches), and Hygrolembidium Schust. (with only lateral + ventral-intercalary branching).

Family JUNGEMANNIACEAE s. lat.

Nothostrepta Schust., gen. n. Surculi apices Plagiochila-formes decurvatos habentes; folia biloba, margine posticali deflexo; gemmae nullae; amphigastria distincta; rhizoidea pauca, ad bases foliorum amphigastriorumque enascentia; ♂ bracteae in inflorescentia tenui spicata repertae, bracteis lobum anticalem inflexum habentibus; ♀ bracteae asymmetricae, profunde 2-3-fidae, lacinias et/aut lobos accessorios habentes; membrana capsulae 5-6-stratosa, cellulis epidermalibus altis (ca. 2X altioribus quam strata interna). Type. Plagiochila bifida Steph., Annal. Istit. Bot. Roma 2:86, 1886 [= Anastrophyllum bifidum (Steph.) Steph., Bih. Kgl. Sv. Vet.-Akad. Handl. 26(3):25, 1900] = Nothostrepta bifida (Steph.) Schust., comb. n.

Also falling here is, presumably (I have seen only sterile plants!), Nothostrepta longissima (Steph.) Schust., comb. n. [Basionym: Anastrophyllum longissimum Steph., Bih. Kgl. Sv. Vet.-Akad. Handl. 26(3):13, 1901].

Although these two species were placed into Anastrepta in two recent papers by Grolle, they diverge widely from that genus. Anastrepta, with a dorsally arched shoot apex, with gemmae, with dispersed rhizoids, is very distinct in numerous respects from Nothostrepta. The Plagiochila-like androecium is linked with a Jamesoniella-like gynoecium -- a most unusual combination. The decurved shoot tips of Nothostrepta are again found in these two genera (and in Cryptochila Schust.) -- but never in true Lophozioideae, to which I think Anastrepta belongs. A paper dealing with this problem will soon appear elsewhere.

Family PLAGIOCHILACEAE

Plagiochilion Matt.

A single species has been known from the Western Hemisphere. A second is now known from the Northern Andes, in Venezuela. The two differ as follows:

1. Leaves ovate, never incipiently bilobed, + imbricate, always opposite; all rhizoids on microphyllous stolons, in fascicles; trigones smaller, basal cells hardly trabeculate-thickened.

P. bryhnii (Steph.) Inoue

1. Leaves, in situ, appearing narrowly obovate (flattened, narrowly ovate-oblong to + lingulate), often incipiently bilobed (1 or 2 apical teeth enlarged); all rhizoids from bases of leafy branches, scattered; trigones coarse, nodose, in longer basal cells longitudinally confluent.

P. intermedium Schust., sp. n.P. intermedium Schust., sp. n.

Species P. bryhnii ramificatione praevalide laterali-intercalari similis; differens, autem, ut (a) folia anguste oblonga, saepe primo biloba, atque orientatio foliorum remota necnon dispositio saepe alterna; (b) omnia rhizoidea ab axibus foliaceis enascentia, dispersa; (c) trigonae grossae, nodosae, in cellulis basalibus longioribus + confluentes. Type. Venezuela. Estado Merida: La Fria, 2500 m., above Merida, Sierra Nevada de Merida (RMS & L. Ruiz-Teran 76-1481c).

The species epithet indicates that this taxon is nearly intermediate between Plagiochila and Plagiochilion, suggesting that the earlier treatment of Plagiochilion as subg. Oppositae of Plagiochila is perhaps to be preferred.

Plagiochila Dumort.

P. fragmentata Schust., sp. n. Planta taxis sect. Bidentum similis foliis fractis et corpusculis oleosis homogeneis; distincta, autem, a omnibus his taxis, foliis confertis, postice secundis, obovato-bilobis, margine dorsali tubulariter revoluta et longe decurrente [basibus foliorum anticalibus iuxtapositis, duas lineas contiguas in superficie dorsali caulis effectis]; folia apicalia grosse dentato-lacerata. Type. Venezuela. Estado Merida: Sierra de Santo Domingo, ca. 3600 m., Paramo de Mucubaji (RMS & L. Ruiz-Teran 76-851d). Also found (usually in small quantity) in the Sierra Nevada de Merida (RMS 76-1460c) and Estado Tachira, S. of Villa Paez (RMS 76-2076a, 76-2077a). Although the strikingly fragmenting leaves and the (5)6-12(13) homogeneous oil-bodies suggest the Bidentes, specifically P. caduciloba and P. jamaicensis, these taxa are widely different in the short-decurrent and nontubular dorsal leaf margins; leaf form in this species is nearly unique.

Family SCAPANACEAE

Scapania subg. Scapaniella (Buch) Joerg.

S. calciphila Schust., sp. n. Gemmae 2-cellulares 9-12 x 14-18 μ ; cellulae marginales foliorum plerumque isodiametricae et cellulis intramarginalibus subaequae; cellulae grosse contiguae papillosae; lobus dorsalis parvus, per solum 0.2-0.35 distalem partem longitudinis discretus; carina 0.6-0.7 longitudinis lobi ventralis. Type. New Hampshire: Beaver Brook Falls near Colebrook, Coos Co. (RMS 74-2852a).

Unfortunately known from very few plants; this saxicolous and calciphilous plant seems allied only to S. vexata and S. glaucocephala (with which it agrees in size, color, and gemma form), differing in the cuticle covered with coarse, conspicuous, weltlike "papillae" and the oil-bodies, 2-4(5) per cell, as well as in the reduced dorsal leaf lobe.

Family GYMNOTRIACEAE

Herzogobryum Grolle

Six species of this subantarctic genus are known; a seventh occurs in New Zealand:

H. filiforme Schust., sp. n. Species H. molli similis foliis paulum bilobis et colore pallide viridi; distincta, autem, ut cellulae parvae sine trigonis, 11-13 x 11-14 μ media folii in parte; distincta necnon ut surculi filiformes, solum ad 150 μ lat. necnon folia parva, solum 180-200 μ lat., minus quam 18 cellulis lat. Type. New Zealand. South Island: Mt. Cook Natl. Park, alpine tussock zone, above Sealy Lakes (RMS 67-4417).

The juvenile gynoecea bear recognizable perianths and no trace of any subtending Isotachis-type perigynium, hence this taxon must be referred to Herzogobryum rather than to Gymnotrium. Affinities are principally to H. molle (which is larger, with leaves 24-26 cells wide) and H. atrocapillum (which is piceous and has merely retuse to short-emarginate leaves).

Family LEJEUNEACEAE

The Lejeuneaceae, especially of the Neotropics, continue to be a source of major difficulty. Intrinsically, the group is difficult: limited "architectural diversity" is linked with parallelism and convergence, to the point where generic and species perimeters are often obscured. Extrinsically, past work, especially that of Stephani, created a giant obstacle to real progress. In modern terms, extant diagnoses are useless. Generic placements, often in better than 50% of cases, are untenable. Hence, identification of "unknown" taxa is often virtually impossible -- aside from cases of stenotypic, taxonomically "simple" genera like Bryopteris and Acrolejeunea, for both of which we have recent revisions. No one has had the

courage to attack the real problematic genera, such as Lejeunea (with at least 12 estimated subgenera) and Cheilolejeunea (with 6 or more subgenera). As a result, one either places taxa of these genera into "limbo" or, if worked on at all, only a small percentage of collections can be named to extant species. Hence, it is almost unavoidable to create new species which eventually prove identical to "old" species hidden in the wrong genus or, often, wrong genera.

Study of old herbarium specimens, in most cases, leads one only a short distance on the road to taxonomic understanding. Branching patterns (and merophyte sequencing, especially on sexual branches) and oil-body criteria offer major clues to both evolution and taxonomy. They are virtually unknown for neotropical taxa.

Under these conditions, research based only on study of herbarium specimens is foredoomed to be the worst kind of "alpha taxonomy," useful only to clear away part of the logjam of accumulated, ill-founded names. Real understanding is possible only with a field knowledge of the species, allowing extrapolation from the environmental perimeters that, to a still-unappreciated degree, strikingly alter the phenotype of the species.

Despite these discouraging, limiting factors, the following taxa of Lejeuneaceae are described as novelties, in part because I cannot find earlier names (and assume they are new), but in part because, even though I assume we will eventually find earlier names (usually in the wrong genus), the taxa involved have been studied cytologically and the cytological data are desperately needed to work out the evolution and phylogeny of the family. The positive gain in establishing sound cytological data helpful in comprehending species-group, subgenus, and genus limits far exceeds the possible negative input from adding additional "unneeded" names.

Blepharolejeunea S. Arn.

This monotypic genus was described with inadequate detail by Arnell. My study of a type fragment revealed that a genus of Ptychanthoideae is at hand with only obscure affinities to other genera; a remote affinity to Lopholejeunea is possible. The affinity to the Ptychanthoideae became evident only after detailed anatomical investigation of Lejeunea (Brachio-Lejeunea) securifolia Spr. [Trans. Proc. Bot. Soc. Edinburgh 15:131, 1884], of which abundant living plants with sporophytes were studied in Venezuela, in 1976. This species bears no affinities to Brachiolejeunea (Spr.) Schiffn., but is allied to Blepharolejeunea. I question whether it is to be placed into Blepharolejeunea, a genus founded for plants unique in subfam. Ptychanthoideae in the strongly laciniate-dentate leaf lobes, or relegated to an adjacently posited genus. I once felt the distinctions were so striking that separate generic treatment was appropriate, but now think that segregation into an autonomous subgenus more correctly reflects current generic concepts; for this the following taxon is founded:

Blepharolejeunea subg. Oreolejeunea. Subgenus a subg. Blepharolejeunea differens ut (a) lobi foliorum bractearumque omnino edentati; (b) ϕ bractea suborbicularis, distaliter rotundata; (c) cellulae membranas solidas atque trigonas magnas et male definitas habentes. Type (and only) species. Blepharolejeunea securifolia (Spr.) Schust., comb. n. [for basionym citation see above].

The basically rectangulate leaf lobule, with sharp apical tooth, the "distalmost" tooth situated midway in the truncate sinus between keel and apical tooth, makes for a lobular structure very different from that in any true species of Brachiolejeunea. A detailed study of the genus is in progress, and a paper with three plates of pertinent drawings will soon appear.

Lepidolejeunea Schust.

This genus, founded in Schuster (1963), has been regarded by some as merely a subgenus of Pycnolejeunea. A knowledge of the cytology of several taxa of both genera proves conclusively that they are very distinct in this respect. Indeed, Lepidolejeunea and Kingiolejeunea Robins. should be united; Pycnolejeunea subg. Perilejeunea Kachr. & Schust. also fits better here. Thus broadly defined, the genus consists entirely of taxa with scattered ocelli, whose size is identical to that of neighboring chlorophyllose cells; the chlorophyllose cells in all cases seen have either no oil-bodies or mere oil-droplets. Some taxa (L. dominicensis; cf. infra) bear caducous leaves; in the only Pycnolejeunea I have seen with asexual reproduction, the leaves show a curious fragmentation of the distal and anterior portions.

The following intrageneric classification, still provisional, seems to most nearly reflect what we know about the phylogeny of the genus.

Lepidolejeunea Schust., Nova Hedwigia, Beih. 9:139, 1963.

Subg. Lepidolejeunea Schust. Type. L. falcata (Herz.) Schust.

Subg. Perilejeunea (Kachr. & Schust.) Schust., comb. n.

Basionym. Pycnolejeunea subg. Perilejeunea Kachr. & Schust., Jour. Linn. Soc. Bot. 56:493, 1961. Type. Pycnolejeunea grandistipula G. ex Steph., Spec. Hep. 5:611, 1914 = Lepidolejeunea grandistipula (G. ex Steph.) Schust., comb. n.

Also probably falling here is Pycnolejeunea dentata Robins., The Bryol. 67:455, 1964 [= Perilejeunea dentata Robins., The Bryol. 70:55, 1967] = Lepidolejeunea dentata (Robins.) Schust., comb. n.

In addition, Lejeunea (Hygro-Lejeunea) devoluta Spr., Trans. Proc. Bot. Soc. Edinburgh 15:236, 1884 [= Lepidolejeunea devoluta (Spr.) Schust., comb. n.] falls here. Pycnolejeunea granatensis Steph., Spec. Hep. 5:610, 1914 [= Perilejeunea granatensis Robins., The Bryol. 70:55, 1967] appears identical.

Subg. Kingiolejeunea (Robins.) Schust., stat. n.

Basionym. Kingiolejeunea Robins., The Bryol. 70:53, 1967.

Type. Kingiolejeunea ornata Robins., The Bryol. 70:53, 1967 =
Lepidolejeunea ornata (Robins.) Schust., comb. n.

Subg. Lepidolejeunea appears to include a minimum of 8-9 species; the following, the only species of the genus I know which regularly bears caducous leaves, appears new:

Lepidolejeunea dominicensis Schust., sp. n. Species a omnibus aliis taxis Lepidolejeunea ut lobi foliorum libere caduci, lobulis persistentibus; gynoecea in ramis foliaceis + elongatis sita, ♀ bracteis bracteoleisque dentatis; innovationes gynoeceales typi Pycnolejeuneae, singulares. Type. Dominica: Freshwater Lake (RMS 66-609c).

I have collected a similar plant in Jamaica, probably referable to L. punctata, in which leaves are uniformly persistent and the thick-walled vegetative leaf cells lack oil-bodies entirely, or, rarely, bear a few almost imperceptible oil-droplets. In the Dominican plant leaf lobes (but not lobules) are freely caducous and the thin-walled chlorophyllose leaf cells bear 2-9 tiny oil-droplets of varying size (all under 1.2 μ in diam.).

The following new combinations, all in subg. Lepidolejeunea, are needed:

Lepidolejeunea borneensis (Steph.) Schust., comb. n. Basionym:

Hygrolejeunea borneensis Steph., Spec. Hep. 5:557, 1914.

Lepidolejeunea multiflora (Steph.) Schust., comb. n. Basionym:

Cheilolejeunea multiflora Steph., Hedwigia 34:243, 1895.

Lepidolejeunea bidentula (Steph.) Schust., comb. n. Basionym:

Pycnolejeunea bidentula Steph., Hedwigia 28:259, 1869.

Lepidolejeunea nicobarica (Steph.) Schust., comb. n. Basionym: P.

nicobarica Steph., Hedwigia 35:126, 1896.

Lepidolejeunea graeffei (Jack & Steph.) Schust., comb. n. Basionym:

Archilejeunea graeffei Jack & Steph., Bot. Centralbl. 60:104, 1894.

Lepidolejeunea integristipula (Jack & Steph.) Schust., comb. n.

Basionym: Pycnolejeunea integristipula Jack & Steph., Bot. Centralbl. 60:107, 1894.

Echinocolea Schust.

This genus, originally monotypic (Schuster, 1963), soon had a second Bornean species assigned to it (Grolle, 1964). Field work in Dominica in 1966 made me aware of the fact that Trachylejeunea dilatata Evs. did not fit into that genus but belonged in Echinocolea. Also, Lejeunea prionocalyx G. fits only here. As a consequence, at least 4 species appear assignable to Echinocolea. A revision of the genus, with pertinent plates, will soon appear. Meanwhile, the following combinations are needed:

Echinocolea prionocalyx (G.) Schust., comb. n. [Basionym: Lejeunea prionocalyx G. in sched. = Trachylejeunea prionocalyx (G. ex Schiffn.) Schiffn., Engler's Bot. Jahrb. 23(5):592, 1897].

Echinocolea dilatata (Evs.) Schust., comb. n. [Basionym: Trachylejeunea dilatata Evs., Bull. Torrey Bot. Club 35:372, 1908].

The type of E. dilatata is from Jamaica. Plants I collected in Dominica appear to be subspecifically distinct:

Echinocolea dilatata subsp. antillana Schust., subsp. n. Subspecies a subsp. dilatata distincta ut ♂ et ♀ gametangia plerumque late seiuncta (plantae saepe velut dioeciae visae); ut cellulae marginales satis magnae (18-26 μ) atque cellulae basales elongatae (2-3:1). Type. Dominica (RMS 67-505).

Oil-bodies in basal cells of these plants are (1)2-4(5) per cell, very large (to 7-8 x 12-24 μ) and diagnostically granular, grayish and opaque or yellowish brown; they are smaller in median and distal cells. Oil-body characters are drastically distinct from those in Trachylejeunea s. str.

Trachylejeunea (Spr.) Schiffn.

The type of this genus, as well as that of subg. Hygrolejeuneopsis, has a lobule with two 1-celled teeth, nearly juxtaposed, between which the hyaline papilla is oriented. However, the type, T. acanthina, is unique in many respects (lack of subfloral innovations; lobes, underleaves, ♀ bracts and bracteoles spinose-dentate; cortical and medullary cells both leptodermous; cells nontuberculate; ocelli lacking). Subgenerically distinct are a series of species forming two autonomous subgenera, as follows:

Trachylejeunea subg. Hygrolejeuneopsis Schust., subg. n.

Subgenus a subg. Trachylejeunea distinctus ut innovationes subflorales plerumque singulares et sine innovationibus, interdum nullae; folium, amphigastrium, bractea et margines bracteolae edentata aut obscure denticulata; cellulae corticeae medullaresque pachydermatae; cellulae tuberculatae; ocelli adsunt. Type. Trachylejeunea aquarius (Spr.) Evs.

Trachylejeunea subg. Trachycoleus Schust., subg. n.

Subgenus a subg. Trachylejeunea distinctus ut lobulus unicum dentem habet, papillis hyalinis hoc manifeste proximalibus; gynoecea, saepe in axibus elongatis, 1(2) innovationibus subfloralibus praedita; innovationes variabiliter orientes, et taxilejeuneoideae et pynolejeuneoideae, steriles aut denuo fertiles; lobi foliorum, amphigastria, bracteae et bracteolae omnes edentatae; cellulae non tuberculatae; ocelli basali adsunt. Type. Trachylejeunea monophthalma Schust. [cf. Schuster, Bull. Torrey Bot. Club 97:345, 1970]. T. grossepapulosa (Steph.) Schust. also fits here.

A paper dealing with the intrageneric classification and affinities of Trachylejeunea is in preparation; plates of the various

entities will be provided there.

Dactylophorella Schust., gen. n.

Plantae satis vigentes; caulis series cellularum 7 corticales + 5-6 medullares, habens, + leptodermatosus. Folia lobos ovato-trianguulares habentia, pinnate lobulata, crispata, lobis secundariis spinoso-dentatis; lobus aspectu hispidus. Lobulus dente apicali 1-cellulari, obtuso, non-falcato praeditus. Ocelli nulli. Amphigastria lobos erectos quorum marginibus recurvatis, spinuloso-muricatis habentia. Type. Lejeunea muricata G. in G. L. & N., Syn. Hep., p. 348, 1845 [= Drepanolejeunea muricata (G.) Steph.] = Dactylophorella muricata (G.) Schust., comb. n.

A segregate from Drepanolejeunea, to which it is not at all closely allied. Differing from this in (a) lobulate dorsal lobes; (b) leptodermous stem cells, the medullary in 5-6 rows; (c) underleaves with erect, strongly spinulose lobes, the sinus U-shaped with reflexed margins; (d) apparent lack of ocelli. The merophyte sequencing is quite different, on the ϕ branches, from that normal to Drepanolejeunea.

The presumed generic affinities will be dealt with separately, and a plate provided.

Cheilolejeunea (Spruce) Schiffn.

In Schuster (1980) the lectotype designation by Evans (1906), which is clearly and unambiguously based on that portion of the mixed original material that bears a spiniform 1-celled apical tooth, is accepted. This lectotypification was specifically emphasized in Evans; it was also accepted in Kachroo & Schuster (1961) and in Schuster (1955, 1963). The subgeneric division proposed in Schuster (1955, 1963) derives directly from the acceptance of Evans' original lectotypification. The later lectotypification by Grolle (1979), based on the fact that most numbers of Spruce's exsiccatae contain other taxa, in mixture or exclusively, is rejected for one simple reason: if we were to start relectotypification of all new taxa of Lejeuneaceae issued in more than one exsiccatus (one single packet), a Pandora's Box of mindboggling proportions would be opened and decades, if not centuries, would elapse while bryologists would try to study as many individual packets (isotypes) of all taxa issued by their predecessors. I refuse to play this "numbers game." Grolle seems unaware of one fact: in the Tropics almost all Lejeuneaceae occur in admixture, often 3-10 species or more within a single square foot on a tree trunk. Hence, many if not all early exsiccatae and most modern ones, unless they are systematically useless micro-collections, are badly mixed. Hence we have no rational alternative but to accept lectotypification by the first worker who revises a group, if that lectotypification is clear and rationally based. Spruce's set in Manchester, subsequent to Spruce's time regarded as the holotype, and the material examined by Evans (Y, NY), all con-

tain the plant with an aciculiform apical tooth of the lobule. Evans was the first to revise Cheilolejeunea sensu Spruce -- and to cleanse its limits (by, i.e., excluding Rectolejeunea, Leiolejeunea, and other elements). Having to choose between the initial Evans lectotypification -- which has stood unchallenged for nearly 75 years -- and the recent one of Grolle, I accept the first; there is nothing to be gained by accepting the latter except the need for perhaps creating at least one new subgeneric name and substituting subg. Cheilolejeunea for taxa now placed into subg. Euosmolejeunea.

Cheilolejeunea and Lejeunea are, by far, the most difficult genera of the entire family Lejeuneaceae. Taxonomic groupings in both genera that are based only on dead material can only be regarded as of temporary relevance: perhaps the single most relevant criterion in both genera are the oil-bodies, followed by ramification patterns. For understanding of both, abundant living plants are needed. Under these conditions, inevitably and unavoidably, the only rational way we may ever understand these genera is by re-describing the taxa from fresh material, basing our taxonomy on recently collected living plants and, with slowly accumulated comprehension of real species limits, to eventually, tentatively at least, place modern-based concepts and classical "species" into juxtaposition.

I know of no other group of Hepaticae for which the extant literature -- and especially that of Stephani -- forms a greater impediment to modern systematics. The conceptual bloc created is almost incredible. There are only two solutions: (1) to accept a herbarium-based and, by its nature, imperfect taxonomy that cannot even hope to qualify as "alpha taxonomy" -- using, as best we can, extant names; or (2) to start afresh and to base our systematics on the living organism, paying minimal attention to the dead fragments found in most herbaria. After decades of indecision, during which time I refrained from publishing new binomials for the simple reason that I could not, in any scientifically sound way, assure that the herbarium specimens of the 19th century were identical with sharply delimited taxonomic entities based on living plants, I have decided that the only sound scientific approach is to give the cytologically-based entities new names if I could not feel certain that the herbarium-based concepts were identical.

The following new taxa, from Jamaica, were studied from living plants in the 1960's; the names have been in MS since the plants were studied, microscopically, in Jamaica. After over a decade of indecision, it seems best to publish them -- even though, inevitably, there may be earlier names, probably in the wrong genus, that may eventually come to light.

Cheilolejeunea aciculifera Schust., sp. n. Plantae pallide virides, superficies loborum (apicibus loborum exceptis) asperae ob tubercula pachydermata, uno in omni cellula; cellulae marginales irregulariter denticulatae, tuberculis pachydermatis eminentibus armatae; carina basaliter levis, distaliter (ab ambitu visa)

denticulata; dens apicalis lobuli acuminatus, perelongatus, unicellularis; lobi foliorum obtusi, decurvati; lobi amphigastriorum saepe divergentes ut in Harpalejeunea, ad cacumina rotundati obtusive. Type. Jamaica: Trail to Caledonia Peak, Blue Mts. (RMS 67-025e); on fern frond.

Insofar as subg. Strepsilejeunea is distinct at all (I placed it, tentatively as subgenus, within Cheilolejeunea; cf. Schuster, 1963, p. 64, p. 112), this species fits that concept. Oil-bodies are coarsely botryoidal, occur (1)2-3 per cell, and measure 4-5 x 13 to 3.2-4 x 8-10 μ ; no trace of ocelli was seen. The keel has papilliform-elevated cells in its distal half only. The divergent and rounded to blunt-tipped underleaf lobes are distinctive. It is possible that this plant may prove identical to Trachylejeunea dominicensis Steph. (Spec. Hep. 5:303, 1915) but the lobule apex in that is described as ending in an "angulo obtuso."

Cheilolejeunea mammiifera Schust., sp. n. Planta pallida ad cinero-viridem; lobi acutissimi, apicibus decurvatis; dens apicalis lobuli tantummodo modicius longus, unicellularis; lobi ob tubercula pachydermata asperi, uno in omni cellula; carina atque superficies lobuli tuberculis grossis, fere sphericis armatae. Type. Jamaica: Caledonia Peak, 200-300 feet below summit; on Podocarpus bark (RMS 67-343).

The unisexual plants are known only from σ individuals; the sharp-pointed leaves bear a lobule with the 1-celled apical tooth only moderately elongated. Leaf cells are strongly armed with salient "tubercles" -- these are almost spherical on the lobule keel and surface and are so large they lie almost juxtaposed. The strongly armed leaves suggest Trachylejeunea, in which, however, the lobular papilla is proximal in orientation and monoecious inflorescences prevail. I have not seen the type of "Trachylejeunea" spruceana Steph. (Hedwigia 35:138, 1896). This is also dioecious and known only from σ plants but is very different in the rounded leaf lobes, not decurved at the apices -- and in the much less coarse armature of the leaves. "T." inflexa is similar, but monoecious.

New Combinations in Cheilolejeunea

Since about 1957 I have had, in manuscript, numerous recombinations under Cheilolejeunea of taxa formerly described in "genera" which I am convinced cannot be maintained as distinct from that genus. Included are taxa described under Euosmolejeunea, Strepsilejeunea, and Anomalolejeunea. I had once intended to prepare a world monograph of the group. However, experience with the North American-Antillean taxa has convinced me that no revision based largely on dead herbarium plants could possibly succeed. In the allied genus Leucolejeunea, my studies of thousands of individuals with regard to ramification patterns (cf. Schuster, 1980, where fragments of these studies are documented), branching modalities -- specifically gynoeceal orientations, the number and nature of subfloral innovations, if present -- have shown that wide variations

dependent on growth conditions of the population sampled prevail. The same is true in Cheilolejeunea, in which some taxa (e.g., C. rigidula; cf. Schuster, 1980) are immensely variable when growing under strongly disparate environmental stimuli. To my dismay, I found that the often fragmentary types (e.g., of C. myriantha), even when fertile, allow no taxonomically meaningful extrapolation. When sterile, the types are almost useless.

I would predict that any attempt to revise Cheilolejeunea s. lat., based only on use of herbarium material, will ultimately prove unsuccessful. I also realize that for workers unable to do the requisite field work, this is the only approach. Yet there is an air of futility about the endeavor: in the late twentieth century, only a nineteenth-century type revision is possible. Having thus come belatedly to this conclusion, I publish below certain new combinations, chiefly in order to place these taxa in their proper position. I have not seen types of many of these taxa and the specimens seen (chiefly from 1955-1963) may not prove authentic in a few cases; hence there is the possibility for erroneous conclusions. Also, realizing belatedly that taxonomic conclusions based on dead herbarium specimens are all suspect, I have not tried to evaluate these taxa; some, without doubt, will prove synonyms of earlier described species. However, in order to clean up generic perimeters, I place the species described below as follows:

Cheilolejeunea (Renilejeunea) montagnei (G.) Schust. (cf. Schuster, 1963, p. 64, p. 112). The winged keel of the ♀ bract is unique and, in spite of the lobular structure, this species may need to be excluded from Cheilolejeunea on this basis and on the basis of the unlobed underleaves.

Placing the species in Leucolejeunea would be no solution: in that genus the lobular hyaline papilla is situated on a projection in the sinus far removed from the "apical" tooth, whereas in C. montagnei the hyaline papilla is inserted on the distal base of the [1-celled] apical tooth, as in all other true Cheilolejeunea species I have seen. I have seen no type and wonder if the affinities of this plant are not closer to Aureolejeunea Schust. (1979).

Cheilolejeunea (Anomalolejeunea) pluriplicata (Pears.) Schust., comb. n. Basionym: Lejeunea (Anomalolejeunea) pluriplicata Pears., Christiania Vid. Selsk. Forh. 1:5, 1887 [= Anomalolejeunea pluriplicata Schiffn., Nat. Pflanzenfam. 1(3):127, 1893].

There is much confusion about this species; the figures in Vanden Berghen (1951, fig. 2) and Arnell (1963, fig. 134) suggest two taxa are at hand. Although Arnell describes (and fig. 134:b illustrates) the cells as with 2-3 botryoidal oil-bodies, his fig. 134 shows cells with solitary oil-bodies! His figures of lobular structure disagree wholly with those of Vanden Berghen.

Cheilolejeunea (Euosmolejeunea) robillardii (Steph.) Schust., comb. n. Basionym: Euosmolejeunea robillardii Steph., Spec. Hep. 5:578, 1914.

Cheilolejeunea (Euosmolejeunea) brachytoma (G.) Schust., comb. n.
Basionym: Lejeunea brachytoma G., Abh. Nat. Ver. Bremen 7:355, 1882.

Cheilolejeunea (Euosmolejeunea) grandistipula (Steph.) Schust., comb. n.
Basionym: Lejeunea grandistipula Schiffn., Engler's Bot. Jahrb. 8:89, 1887 [= Euosmolejeunea grandistipula Steph., Spec. Hep. 5: 578, 1914].

Cheilolejeunea (Euosmolejeunea) longiflora (Tayl.) Schust., comb. n.
Basionym: Lejeunea longiflora Tayl., Lond. Journ. Bot. 5:396, 1846.

Cheilolejeunea (Euosmolejeunea) coronalis (G.) Schust., comb. n.
Basionym: Lejeunea coronalis G., in G. L. & N., Syn. Hep., p. 361, 1845.

Cheilolejeunea (Euosmolejeunea) fragrantissima (Spr.) Schust., comb. n.
Basionym: Lejeunea (Euosmo-Lejeunea) fragrantissima Spr., Trans. Proc. Bot. Soc. Edinburgh 15:243, 1884.

Cheilolejeunea (Euosmolejeunea) laxiuscula (Spr.) Schust., comb. n.
Basionym: Lejeunea (Euosmo-Lejeunea) laxiuscula Spr., Trans. Proc. Bot. Soc. Edinburgh 15: 244, 1884.

Cheilolejeunea (Euosmolejeunea) suaveolens (Spr.) Schust., comb. n.
Basionym: Lejeunea (Euosmo-Lejeunea) suaveolens Spr., Trans. Proc. Bot. Soc. Edinburgh 15:245, 1884.

Cheilolejeunea (Euosmolejeunea) subcrenulata (Spr.) Schust., comb. n.
Basionym: Lejeunea (Euosmo-Lejeunea) subcrenulata Spr., Trans. Proc. Bot. Soc. Edinburgh 15:245, 1884.

Cheilolejeunea (Euosmolejeunea) comans (Spr.) Schust., comb. n.
Basionym: Lejeunea (Euosmo?-Lejeunea) comans Spr., Trans. Proc. Bot. Soc. Edinburgh 15:246, 1884.

Cheilolejeunea (Strepsilejeunea) krakakammae (Lindenb.) Schust. (1963, p. 112).
Basionym: Lejeunea krakakammae Lindenb., in G. L. & N., Syn. Hep., p. 353, 1845 [= Strepsilejeunea krakakammae Steph., Hedwigia 29:74, 1890].

Cheilolejeunea (Strepsilejeunea) brevifissa (G.) Schust., comb. n.
Basionym: Lejeunea brevifissa G., Abh. Nat. Ver. Bremen 7:356, 1882.

Cheilolejeunea (Strepsilejeunea) georgiensis (S. Arn.) Schust., comb. n.
Basionym: Strepsilejeunea georgiensis S. Arn., Bot. Not. 1953:179, 1953.

Lejeunea Libert

With at least 11-12 groupings that are best regarded as subgenera, Lejeunea may prove to be the largest genus of the family. It is also the most difficult (cf. Schuster, 1963, p. 128 et seq.; Schuster, 1980). Not only is the intrinsic difficulty enormous--several other sources of possible error must be considered: (a) A very large ensemble of "species" -- a veritable floating poulation -- of unstudied taxa exists, described under "Lejeunea"; most, but not all, belong to other genera. (b) As in Cheilolejeunea, oil-body types + ramification patterns offer two of the most important criteria for species and group discrimination; as in Cheilolejeunea, androecial form (σ bracteoles only at base; σ bracteoles throughout androecium) is equally important. Oil-bodies are known for few species; ramification patterns cannot be adequately deduced from most of the scrappy type material seen -- and the patterns, sufficiently malleable intrinsically, are furthermore subject to manifest changes with environmental differences; androecia are inadequately described in almost all extant diagnoses, most of which, in general, are useless in any modern sense. Under these conditions, descriptions of new taxa seem almost futile; yet the following three, after much search, could not be placed.

Lejeunea (Lejeunea) cyanomontana Schust., sp. n. Gynoecea, saltem partim, acrogyna, numquam σ innovationibus praedita; cellulae pauca corpuscula oleosa segmenta habentes; lobuli longi (ad 0.5 longitudinis lobi) dente apicali + hamato praediti; caulis 7-9 series cellularum medularium habens. Type. Jamaica: Caledonia Peak, Blue Mts. (RMS 67-345a).

This small species (sterile axes only 450-520 μ wide) may be sought under subg. Microlejeunea; the stem, however, has 7-9 rows of medullary cells. In this, in the autoecious inflorescences, the obliquely ascending leaves, and abbreviated union of bracts + bracteoles in the gynoeceum, as well as in aspect, it is similar to L. autoica Schust. At once distinct in the larger underleaves, 140-160 μ broad, with lobes 5-6 cells wide, contiguous and rather elevated leaves, more compact androecia, lobes and lobule apices of ϕ bracts normally broadly rounded.

Lejeunea (Lejeunea) androgyna Schust., sp. n. Gynoecea omnia in ramis lateralibus brevibus sita, innovatione 0 vel σ , longitudine determinatis; cellulae pauca corpuscula oleosa segmentata habentes; dens apicalis lobularis obtusus, non hamatus; cellulae corticeae ventrales parvae, ca. 25 μ lat. Type. Jamaica: Caledonia Peak, Blue Mts. (RMS 67-345b).

Gynoecea in this plant are, almost without exception, on very short lateral branches, each of which often produces a small, spicate, often curved androecial innovation, or, alternatively, are innovation-free; no gynoecea with sterile innovations have been

seen. The segmented-botryoidal oil-bodies and aspect otherwise suggest L. glaucescens G., an otherwise exceedingly distinct species. I have seen a single athecal, infra-axillary, Radula-type, sterile branch in this species; this occurs again, in known taxa, only in plants currently referred to Taxilejeunea s. ample (cf. Schuster, 1980).

Lejeunea (Microlejeunea) capillaris subsp. antillana Schust., subsp. n. Subspecies a subsp. capillari different ut dens apicalis lobuli plene expositus; amphigastria maiora, 120 x 85 μ ; lobi maiores 250 x 150 μ . Type. Jamaica: Caledonia Peak, Blue Mts. (RMS 67-341a).

Distinct from L. capillaris G. s. str. in the orbicular underleaves, the ϕ bracts with lobuli much shorter than the lobes, and in other criteria. Perhaps an autonomous species.

Cololejeunea (Spr.) Schiffn. and Aphanolejeunea Evs.

Plants of these two genera, especially when epiphyllous, often occur in very small populations, and often badly mixed [I have seen as many as 8-9 species on a single leaf!]. Lectotypifications here need to be practiced with wisdom and restraint, in order to avoid creation of enormous chaos. I am aware of many problems because of mixed collections; I trust that an eventual monographer will exercise the requisite restraint.

Although often regarded as identical (most recently by Stotler & Crandall-Stotler, 1977), the two genera are very distinct, even at first glance, by their branching modes alone (Schuster, 1980).

Speciation has been almost as explosive here as in Lejeunea. The very small size and occurrence often as only isolated plants make study of the smaller taxa (and of all Aphanolejeunea) difficult. Many undescribed taxa remain, and species limits are often imprecise. The following five taxa, all from Jamaica, appear to be undescribed.

Cololejeunea papulosa Schust., sp. n. Species ab omnibus taxis Americanis distincta ut cellulae lobulorum perelongatae atque saepe sigmoideae; cellulae carinae inflatae papulosaeque; perianthium dorsaliter complanatum; folia anguste ovata. Type. Jamaica: Trail from Hardwar Gap to Caledonia Peak, Blue Mts. (RMS 67-025a).

Similar to Aphanolejeunea diaphana in the narrowly ovate leaves, widest below the middle, and in the 2-celled tooth of the lobule apex. Leaves, however, are not dimorphic; gemmae occur on ventral lobe faces; cells are nontuberculate; the keel is margined by strikingly papulose-inflated cells, while the lobule itself is formed of narrow, elongate, often sigmoidal cells.

Cololejeunea parallelifolia Schust., sp. n. Folia lingulata, ad apicem rotundata; perianthium non complanatum, carinis supra + angulatis denticulatisque; gemmae 16-cellulares, angulares; cellu-

lae foliorum inflatae, numquam tuberculata; planta paroecia.

Type. Jamaica: Trail from Hardwar Gap to Caledonia Peak, Blue Mts. (RMS 67-025).

Constantly paroecious; even σ bracts may bear antheridia. Lobular structure (lobule ending in a 2-celled tooth) as in the foregoing and as in A. diaphana. Distinct in the nondimorphic leaves, rounded leaf lobes, often rather obovate-oblong, and the nonpapulose cells of the leaf keel.

Aphanolejeunea lancifera Schust., sp. n. Dens apicalis lobularis 2-cellularis; hamatus, folia semper valde dimorphica; folia lobulata lobulos 0.5-0.6 longitudinis loborum habentia; lobi lanceolati, longitudo:latitudo 3-4:1; carinae perianthii natura leves.

Type. Jamaica: Below summit of Caledonia Peak, Blue Mts. (RMS 67-342).

Distinct from the A. gracilis-verrucosa-ephemeroides complex in the 2-celled apical lobular tooth which is optimally developed, strongly hooked, almost impinging on the keel apex. Perhaps allied to A. cingens Herz. but the latter differs in being smaller (leaves 260 μ long vs. to 325 μ long), has wholly smooth leaf cells (in A. lancifera the keel, distally, has strongly tuberculate cells), and bears elobulate leaves only 3-4 cells long (4-6 cells wide x 5-8 cells long in A. lancifera).

Aphanolejeunea gracilis var. linearifolia Schust., var. n. Varietas a var. gracili differens ut omnia folia linearis, elobulata; σ bracteeae + lineari-lanceolatae; cellulae perianthii carinarum et inter carinas forma tuberculorum obtusorum elevatae.

Type. Jamaica: Trail from Hardwar Gap to Caledonia Peak, Blue Mts. (RMS 67-025).

The remote, almost uniformly elobulate leaves are only 2 cells wide and consist of ca. 7-8 elongated "cell tiers" -- formed, except at the tip, of 2 cells, side-by-side; each leaf is terminated by a single sharp cell. Occasional plants produce an isolated lobulate leaf, with the 2-celled apical tooth of typical A. gracilis. Perianths are bluntly tuberculate on both keels and the intervals between them, unlike in A. gracilis proper. The latter, although described as dioecious, is, like the var. linearifolia, unquestionably autoecious.

Aphanolejeunea jamaicensis Schust., sp. n. Dens lobularis apicalis unicellularis; folia hispid-tuberculata, tuberculis altis, ad cacumina incrassata; lobi foliorum 2-2.2 plo longiores quam lati, cacuminibus plerumque in 2 cellulas terminantibus; folia elobulata minora quam lobulata. Type. Jamaica: Track from Hardwar Gap to Caledonia Peak, near waterfall, Blue Mts. (RMS 67-019).

The autoecious species is close to A. sicaefolia in the 1-celled apical lobular tooth. However, the type is mixed with the

latter and clearly distinct in: the tuberculate, hispid cells (never hispid in admixed A. sicaefolia) present throughout except for lobular surface; lobes ending in (1)2 single cells; elobulate leaves ca. 150 μ long and much smaller than lobulate ones; σ bracts with lobules ca. 5-7-celled.

Family JUBULACEAE

Asakawa et al (1979, p. 73) recently split this family into two, Jubulaceae and Frullaniaceae. Among the primary criteria cited for this segregation is seta anatomy: Jubulaceae with a 16 + 4-seriate seta, Frullaniaceae with it "composed of many, irregularly arranged cell rows." On that basis Amphijubula Schust. (Schuster, 1970) would have to be placed into the Jubulaceae, even though its other criteria (spores large, with rosette-type tubercles on surface; subfloral innovation, when present, Frullania type; copper-colored cell walls; Frullania-type σ branches, the androecium with a bracteole at base only) clearly assign it to a position nearer to Frullania. Engel (1978) had, indeed, placed Amphijubula under Frullania. I think the positions of both Asakawa et al. (1979) and Engel (1978) are untenable. They illustrate perfectly my statement (Schuster, 1970) to the effect that once the initially bigeneric Jubulaceae are studied more carefully, the taxonomy of the family would become "much more complex" -- and that "before it becomes simpler it will become more complex still." In the light of these two recent papers, which are conceptually poles apart, my predictions acquire an aura of prescience.

Ultimately, I think a taxonomic position somewhere between the two recent extremes adopted will prove most generally acceptable; such an intermediate position will necessitate the adoption of Amphijubula as a genus, and will entail the following new combinations:

Amphijubula Schust., Jour. Hattori Bot. Lab. 33:301, 1970.

A. microcaulis (Gola) Schust., comb. n. Basionym: Frullania microcaulis Gola, Nuovo Giorn. Bot. Ital. II, 29:172, 1923.

Synonym: Amphijubula spruceana Schust., Jour. Hattori Bot. Lab. no. 33:301, 1970.

Gola described his plant as dioecious; this error misled me in to thinking that the clearly monoecious A. spruceana was distinct.

A. lobulata (Hook.) Schust., comb. n. Basionym: Jungermannia lobulata Hook., Musci Exot. 2: pl. 119, 1820 [= Frullania lobulata Dumort., Rec. d'Obs., p. 13, 1835].

Engel states that this plant finds its "closest relative" in A. microcaulis and I therefore transfer it to that genus. Since I have not seen sporophyte-bearing material, an element of uncertainty remains as to its proper generic provenance.

FOOTNOTE

1

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I am indebted to Dr. Hannah Croasdale for the Latin diagnoses.

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Nitrogen Sources and Cleistothecial Production of
Monascus ruber van Tieghem

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Abstract. Cleistothecial production of Monascus ruber van Tieghem was examined with ammonium sulfate or sodium nitrate as nitrogen sources in the presence and absence of zinc chloride. More cleistothecia were produced when sodium nitrate was available than when ammonium sulfate was present. Zinc chloride appeared not to be a controlling factor.

The genus Monascus was first described with two species, Monascus ruber and Monascus mucroides (van Tieghem 1884). The genus is cosmopolitan in nature and world wide in distribution with the inclusion of other species in the genus.

Monascus ruber van Tieghem is a homothallic Ascomycete that produces great numbers of cleistothecia in axenic culture. Previous studies have included relationships between cleistothecial production and nutritional or environmental parameters. These diverse studies involved temperature relations (Manandhar and Apinis 1971), hydrocarbons (Schade 1937), exposure to fast-neutron and X-rays (Wong and Bau 1978), percentage of lactic acid in the medium (Young 1930), and nitrogen sources (Carels and Shepherd 1977). The current investigation directs attention to the effects of ammonium sulfate and sodium nitrate on cleistothecial production of M. ruber.

The strain of M. ruber selected for study was isolated from harvested sorghum in northern rural Taiwan. The basal minimal medium (nitrogen source, 2.0 g; K_2HPO_4 , 1.0 g; KCl, 0.5 g; $FeSO_4 \cdot 7H_2O$, 0.01 g; anhydrous glucose, 50.0 g; distilled water, 1,000 ml) included ammonium sulfate and sodium nitrate as nitrogen sources adjusted to a pH of 6.2 (McHan and Johnson 1970). The media were divided into two groups, one receiving a zinc chloride supplement of 8 ppm and the other lacking the supplement. All glassware was cleaned with detergent, then with a potassium dichromate - sulfuric acid solution, and rinsed repeatedly with double distilled water.

The inocula were grown in petri plates containing Noble Agar Special (Difco) at 30 g/l and one nitrogen source at 2 g/l for 14 d. A 4 mm² colony section was removed aseptically and blended for 30 sec in a Waring Blendor containing 50 ml of double distilled water. One ml of the suspension was transferred aseptically to 250 ml Ehrlenmeyer flasks with Morton closures containing 50 ml of the medium and one nitrogen source. Cultures were incubated at 25 C on a rotary shaker at 100 rpm for 14 d. At cleistothecial initiation, the contents of the flasks were blended for 30 sec in a Waring Blendor. Cleistothecial production was determined using a Howard Mold Counter in replicates of 25.

As shown in Figure 1, the sodium nitrate produced a dramatic

increase in the number of cleistothecia at 7 and 8 days incubation. Zinc chloride supplemented nitrate medium produced a greater abundance of cleistothecia at days 7, 13, and 14 but fewer between days 8 through 12 compared with the cultures lacking zinc. At 14 days incubation the total number of cleistothecia in flasks containing sodium nitrate with and without zinc was nearly equal. Cleistothecia were mature at 13 days incubation in both groups.

In ammonium sulfate medium, the production of cleistothecia was greatly reduced compared with media containing sodium nitrate either with or without zinc chloride. The ammonium sulfate and zinc medium had peak cleistothecial production at 11 days incubation. Cleistothecial numbers were greater on days 9, 10, and 11 with zinc chloride compared with the ammonium sulfate medium without zinc. Mature cleistothecia were noted at 7 days growth in media containing ammonium sulfate with and without zinc. At 14 days incubation the ammonium sulfate medium without zinc chloride had a greater number of cleistothecia. The sodium nitrate with zinc had a slightly higher cleistothecial production than the sodium nitrate medium without zinc chloride. Whether or not zinc chloride was added to the media, the sodium nitrate source produced more cleistothecia than did the ammonium sulfate source. Zinc may influence the abundance of cleistothecial formation but it is not essential for cleistothecial production.

Vegetative growth was more dense with the ammonium sulfate medium than with the sodium nitrate medium, with or without zinc chloride. The ammonium ion provides a more utilizable nitrogen source than the nitrate ion for a more rapid growth (Hacskeylo et al. 1954, Moore-Landecker 1972). Klebs (1899) using Saprolegnia mixta found that the conditions required for good vegetative growth were not necessarily those for sporulation. The current study revealed that the sodium nitrate medium produced greater numbers of cleistothecia than did the ammonium sulfate medium.

It is considered that fungi require zinc for growth either as an activator or as part of an enzyme. Studies with suboptimum concentrations of zinc with some fungi have shown reduced sporulation and growth (Lilly 1965). Intracellular concentrations of ions may be controlled by influx and efflux systems. Candida utilis has been shown to lack an efflux system for eliminating zinc ions. The reduction of zinc is accomplished by the dilution of zinc into the daughter cells (Failla and Weinberg 1977). Viability, longevity, and growth rate are also influenced by the presence of zinc in the growth substrates (Steenberger et al. 1969). McHan and Johnson (1970) indicated that zinc increased growth in Monascus purpureus at 0.0005 ppm concentration. The increase was linear from 0.04 to 0.2 ppm with an optimum concentration at 0.8 ppm. From 0.8 ppm to 6.4 ppm there was less growth than at the optimum concentration.

Minerals exert effects on the sexual sporulation of fungi. Calcium neutralizes the effect of an acidic medium for Chaetomium globosum (Hawke 1957). The number of perithecial initials of Sordaria are doubled when boron is added to a liquid sucrose medium (Turian 1955). Cleistothecial formation is controlled by manganese in Aspergillus (Zonneveld 1975) while Neurospora tetrasperma

required zinc for normal cleistothecial formation (Turian 1966).

Fungi vary in their ability to utilize nitrogen sources. Many fungi are capable of reducing nitrate to ammonia prior to incorporation into biological molecules. Others are only able to utilize nitrogen at the oxidation level of ammonia or in an organic form with the same oxidation level (Cochrane 1958; Moore-Landecker 1972). In one study with M. purpureus, a more rapid growth was noted on a medium containing ammonium nitrogen than on a medium containing nitrate as the nitrogen source (HacsKaylo et al. 1954). The reduction of the nitrate ion to the ammonium ion and its subsequent incorporation into metabolites apparently required more time and greater energy expenditure compared with ammonium nitrogen utilization by fungi.

It was found that species of Monascus have an increased cleistothecial proliferation with nitrate ions while ammonium ions reduced sporulation similar to M. ruber (Carels and Shepherd 1977). Vegetative growth initiates sexual reproduction with a reduced nitrate uptake. Ito (1961) concluded that ammonium ions are necessary in the early stages of perithecial development while nitrate ions are required later for perithecial formation in Neurospora crassa. In Calonectria camelliae, fertile perithecia developed in a medium containing the ammonium ion only while the nitrate nitrogen containing medium did not initiate ascus formation (Shipton 1977). Mature M. ruber cleistothecia did not appear until 13 days incubation in the nitrate medium while they were present on day 7 with the medium containing ammonium nitrogen.

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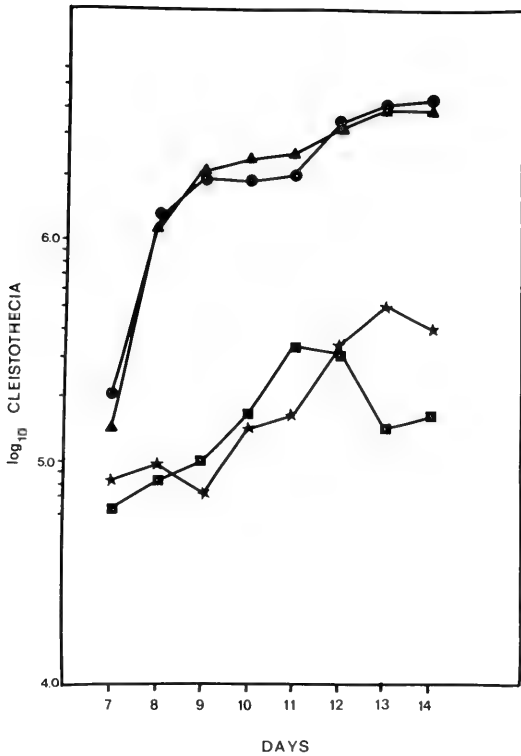


Figure 1. Cleistothecial production of Monascus ruber on basal medium with the addition of

- nitrate nitrogen with zinc,
- ▲ nitrate nitrogen without zinc,
- ammonium nitrogen with zinc, and
- ★ ammonium nitrogen without zinc.

BOOK REVIEWS

Alma L. Moldenke

"THE SOCIAL ANIMAL" Second Edition by Elliot Aronson, xvi & 336 pp., 9 b/w line draw. W. H. Freeman & Co., San Francisco, California 94104. 1976. \$14.00 clothbound & \$6.50 paperbound.

Folks in the biological sciences familiar with both editions of this work, will probably consider this newer one to be honed more scientifically, especially in reference to its experimental set-ups with human subjects. Despite controls far superior to many used in human educational, psychological and sociological experiments I wonder if there are enough data to be statistically sound? Were the outcomes because of, in spite of, or without any causal connection to the operant conditions? The text presentation is clear and engaging, far better than most in this general area.

"MCGRAW-HILL ENCYCLOPEDIA OF OCEAN AND ATMOSPHERIC SCIENCES"
edited by Sybil P. Parker, chief of staff, ii & 580 pp. & over 500 b/w photos, maps, line draw., graphs. McGraw-Hill Book Co., New York, N. Y. 10020. 1979. \$34.50.

"This Encyclopedia is an interdisciplinary treatment of the ocean and atmospheric sciences.....[providing] both theoretical and practical information on subjects such as weather forecasting, mining and farming of the seas, atmospheric pollution, satellite programs, industrial meteorology, climate modification, and deep-sea diving" in 236 effectively explained and well illustrated articles. Some are taken from the recent fourth edition of the fine "McGraw-Hill Encyclopedia of Science and Technology"; others are especially prepared by some of 200 international authorities. The entries are made easily accessible by thorough cross-referencing and by a detailed analytical index. This compilation of valuable information should prove very useful.

"PLANT SYSTEMATICS" by Samuel B. Jones & Arlene E. Luchsinger, xi & 388 pp., b/w illus. by 89 fig., 25 photos, & 13 tab. McGraw-Hill Book Company, New York, N. Y. 10020. 1979. \$15.95.

This text, incorporating the newer approaches, is aimed at the upper undergraduate or lower graduate level for two quarters or one and/or two semesters. Much in the plain style of the old Swingle of my college days, the authors develop first the historical background, then plant nomenclature and the sources of taxonomic evidence, possible origin(s) of angiosperms, evolution and biosystematics and methods of identifying vascular plants. The chap-

ter on herbarium use and specimen preparation is the best I have ever seen published. The chapter on selected literature of systematic botany is well selected and annotated. There are separate chapters on pteridophytes and gymnosperms followed by one on prominent North American angiosperm families à la Cronquist. An appendix gives more details of this system, another lists the Thorne system, and yet another appendix gives meanings for some Latin and Greek specific epithets and prefixes. Some of the line drawing figures appear to have been very hastily sketched, but not inaccurately. This is a well developed, reasonably priced text.

"DESCRIPTIVE NOTES ON PAPUAN PLANTS Parts I--IX" by Ferdinand von Mueller, 197 pp. Limited Reprint Edition. Boerhaave Press, P. O. Box 1051, Leiden, Holland. 1979. 125 Dutch florins paperbound.

Because this classic listing of plants with descriptions, locations, and family groupings has long been out of print and even had some of its copies destroyed during the wars in Europe, it is fortunate that today's botanists may now have readier access to it again. Parts I--V, originally published in 1875, and parts VI--IX, originally published in 1885, are all in a single reprint with indices for each part.

"WILD FLOWERS OF THE BIG THICKET, East Texas, and Western Louisiana" by Geyata Ajilvsgi, ii & 361 pp., 1 b/w map & 483 color slide prints. Texas A. & M. University Press, Drawer C, College Station, Texas 77843. 1979. \$9.95 paperbound & \$17.50 clothbound.

This "biological crossroads of North America" once covered over 3,000,000 acres but is now trimmed considerably by farming, lumbering, oil production, etc. The map gives too few details to be of much use. The color plates are grouped according to 9 habitats which are themselves first illustrated; then page references to text are given with the common name under each plant photograph. The text is arranged according to plant families with common and scientific names, plant descriptions of leaves, inflorescences, blooming times, and fruits. These habitats are (1) mixed-grass prairies, (2) palmetto-oak flats, (3) sweet gum - oak floodplains, (4) bay-gallberry holly bogs, (5) longleaf-black gum savannas, (6) longleaf-bluestem uplands, (7) beech-magnolia-loblolly slopes, (8) oak-farkleberry, and (9) roadsides -- all certainly worth pre-serving!

"THE COLOR NATURE LIBRARY OF ORCHIDS" by Peter Taylor, 63 pp. & 133 color photographs. Crescent Books of Crown Publishers, Inc., New York, N. Y. 10016. 1979.

The author, long associated with the herbarium at Kew, is now in charge of the orchid collections there. He reminds us that "Only a relatively small number of genera are commonly grown, but by hybridisation both within and between genera over 40,000 cultivated kinds have been named", and that they often can be readily perpetuated by meristem culturing. "A small heated greenhouse and a little know-how will enable anyone to grow many of the beautiful flowers depicted on the following pages." Such beauties they are! Such excellent photography of small to double page illustrations! This book is admirable for a gift, a coffee table, or a night table.

"SACRED NARCOTIC PLANTS OF THE NEW WORLD INDIANS: An Anthology of Texts from the 16th Century to Date" compiled by Hedwig Schleiffer, v & 156 pp., 10 b/w fig. Hafner Press of Macmillan Publishing Company, New York, N. Y. 10022. [1973] 1974. \$6.50 paperbound.

These 100 excerpts, grouped according to the plant families involved, describe the medical, religious, narcotic, hallucinatory, intoxicating, and psychic effects of these products and the aura in which they are taken. Ethnobotanist R. E. Schultes writes the introduction; other reliable outstanding botanists have been quoted from their field experiences, such as E. F. Poeppig, C. F. P. von Martius, R. Spruce, C. V. Morton, etc. The narcotic complex -- psychic and/or physiological -- is represented by some members of agarics, cactads, convolvus, erythroxyls, legumes, malpighs, myristads and solanads. Reading this material should fascinate and inform very many people with a wide range of interests.

"THE RACE BOMB: Skin Color, Prejudice and Intelligence" by Paul R. Ehrlich & S. Shirley Feldman, xiii & 254 pp., 13 b/w fig., 4 maps & 4 tab. Ballantine Books of Random House, Inc., New York, N. Y. 10022. [1977] 1978. \$2.25 paperbound.

Like Ehrlich's "Population Bomb", the "'race bomb' must be defused if humanity is to cooperate in solving pressing problems." The logically explained and carefully documented chapters present races of *Homo sapiens* as socially, rather than biologically, defined with the concomitant explanations historically for most of slavery and recently for the many other forms of prejudice in education, work, housing, assistance, etc. The authors, in exposing the inherent limitations of standard I.Q. tests, answer the genetic racism theories of A. Jensen, Wm. B. Shockley, H. J. Eysenck, etc. This book is planned for the general reader who certainly should profit by reading it.

"JOHSEL NAMKUNG: AN ARTIST'S VIEW OF NATURE" presented by the Seattle Art Museum, 36 pp., 30 color photoplates. University of Washington Press, London & Seattle, Washington 98105. 1978. \$5.95 paperbound only.

Namkung prefers to work with color-negative film, has it processed routinely, but does the development of the print manipulatively "as an integral part of the total process of the artist with his camera". Namkung states that "photography is the reflection of things which already exist in their own right, but they need an artist, so that they may be fully seen and understood by man.....I would like to impart not just visual sensations but the third dimension of the visual world". So much to see and feel in the grandeur of these photographic plates!

"WHO NAMED THE DAISY? WHO NAMED THE ROSE? A Roving Dictionary of North American Wildflowers" by Mary Durant, ix & 214 pp., 52 b/w line draw. Dodd, Mead & Co., New York, N. Y. 10016. [1976] 1977. \$7.95.

"This [charmingly interesting] dictionary is a roving collection of [over 100] plant names that can be translated -- plant names that do not immediately explain themselves at first glance. Some have meanings hidden in Arabic, Sanskrit, Algonquian, ancient Germanic tongues,.....[or] were drawn from mythology or given in honor of early botanists", etc. The answer to the title's first question is the Anglo-Saxons with "daezes eye" originally meant to apply to the British *Bellis perennis* which closes at nightfall and reopens at sunrise as the "day's eye" and not the ox-eye daisy or *Chrysanthemum leucanthemum*. The answer to the second question is a blank: rose is the same or similar in dozens of languages back to the early Latin rosa. No meaning for it has been found but it adds meaning to many other words. Delightful excerpts of naturalist prose and poetry are quoted throughout the book. Cross references are inserted advantageously. Many graceful swirls of recognizable flowers head or end chapters.

"BABOON ECOLOGY - African Field Research" by Stuart A. Altmann & Jeanne Altmann, viii & 220 pp., illus. by 59 b/w fig., 26 tab., 1 map, & 24 photo. University of Chicago Press, Chicago, Illinois 60637. 1973 Second Printing. \$4.95 paperbound only.

The Masai Amboseli Game Reserve and surrounding savanna and other areas in East Africa provide the milieu in which baboons, particularly the yellow *Papio cynocephalus*, "are among the most widespread abundant and adaptable of primates". From June 1963 through August 1964 the authors' "goal was to understand how the animals cope with the problems that they face in their natural habitat.....[and] to obtain records that would be adequate, in terms of

accuracy of observation, quality of description, and quantity of data." The main topics covered are: criteria for selection of study sites and methods, populations, sleep groves and patterns, group movements diurnally and seasonally, food and water, predators and other animals, and speculations about population dynamics, sexual dimorphism, etc.

In this attractive, interesting and popular report (probably culled from Ph.D. theses) these goals have certainly been achieved, and many folks in much of the world have been able - because of such studies - to enjoy more knowingly their tourist trips to Africa and the color television shows on these subjects.

"VOLCANOES" by M. B. Lambert, vi & 64 pp, 70 b/w photo, 2 maps, 7 fig. University of Washington Press, London, & Seattle, Washington 98105. 1979. \$10.95.

"This is an introduction to the subject of volcanoes outlining the nature of volcanic eruptions, the products derived from them, and their impact on society and the environment." The text is carefully expletive about magma, kinds of lava and other products of explosion, tsunami and other events accompanying volcanism, monitoring and possible prediction of volcanoes, and such usefulness as island formation, and harnessing of geothermal power. The many excellent photographic illustrations of kinds of lava flows and of such famous volcanoes as Surtsey, Etna, Vesuvius, Mauna Loa, Krakatoa and Kilimanjaro are compelling to view.

"RAVENS, CROWS, MAGPIES AND JAYS" by Tony Angell, 112 pp. & 84 illus. University of Washington Press, London & Seattle, Washington 98105. 1978. \$14.95.

Almost half of this book describes in manual style the 18 species of these corvids in the United States and illustrates each one beautifully and usually doing something rather than posing inertly. The rest of the book with more superb activity illustrations describes, often from the author's years of observation, (1) social strategies for survival, as sentries and nestling services, mobbing and flocking, (2) tool using and other problem solving, (3) talking, (4) generalist and variable food habits and (5) "In an era of ever-increasing disrupted terrestrial environments, corvids have proved particularly adept at exploiting the available energy resources. This family may be unique in the diversity and sophistication of their strategies for gaining that elemental and essential component for viable life - the energy edge." A fine book!

"ETHNOBOTANY OF WESTERN WASHINGTON - The Knowledge and Use of Indigenous Plants by Native Americans" Revised Edition by Erna Gunther, i & 71 pp., 42 b/w line draw. & 1 tab. University of Washington Press, London & Seattle, Washington 98105. 1973. \$8.50 clothbound or \$4.95 paperbound.

This study was first printed in 1945 in regular hard book binding, reissued in six additional printings and then two revisions in both forms in '74 and '77. It was gathered by the author and others, with specimens in hand, who interviewed the various Amerind men and women of several tribes throughout the western part of the state, as to the identity, food, material, medicinal and miscellaneous uses. The eight plates of truly excellent line drawings of many of these plants were reproduced with permission from Hitchcock's "Vascular Plants of the Pacific Northwest".

"PLANTS AND ANIMALS OF THE PACIFIC NORTHWEST - An Illustrated Guide to the Natural History of Western Oregon, Washington, and British Columbia" by Eugene N. Kosloff, viii & 264 pp. & 48 color plates of 321 photos., 123 b/w illus. & 1 map. University of Washington Press, London & Seattle, Washington 98105. 1978. \$8.95 paperbound & \$17.50 clothbound.

The beautiful, larger sized, clothbound edition came off this press a couple of years earlier to a most happily receptive group of viewers, readers and reviewers, the present journal included. Because of price, it was barred from some who now can much more readily purchase this attractive paperbound edition. This guidebook is organized "around certain habitats and biotic assemblages that are abundantly represented in our [west of the Cascades] region.... for it brings together the descriptions of species that are most likely to be found in a particular situation." The book is meant, not for systematic studies, but for the natural history and amateur approach. It would actually be a good idea to keep a paperbound copy in the car or cycle pack and to jot field notes and dates in it and keep the clothbound copy for the coffee table, guest room or library shelf at home.

"PACIFIC SEASHORES - A Guide to Intertidal Ecology" by Thomas Carefoot, 208 pp., 80 color plates, 30 b/w photos, 2 maps, & 176 draw. University of Washington Press, London & Seattle, Washington 98105. 1977. \$12.95 paperbound.

The book is enticingly arranged, realistically illustrated with color photos of many common intertidal organisms, clearly explained in the ecologically oriented text, and well set-up with glossary, index and further references. There are particularly interesting chapters for the naturalist or the beginning student on the Seashore, Water Movement, Causes of Intertidal Zoning, Mariculture, & Pollution.

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PHYTOLOGIA

A cooperative nonprofit journal designed to expedite botanical publication

Vol. 45 June 1980 No. 6

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
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SPIRANTHES CHIANGII (ORCHIDACEAE), NEW SPECIES

FROM THE CHIHUAHUAN DESERT REGION

Marshall C. Johnston

Department of Botany and Plant Resource Center

The University of Texas at Austin, Austin, Texas 78712

Continuing studies of the flora of the Chihuahuan Desert Region, supported in part by National Science Foundation grant BMS 73-00898-AO2, have yielded specimens of a species of orchid that I have been unable to assign to any previously described species and have been unable to match with any previously collected specimens. I am pleased to dedicate this new species to my student, one of its collectors, Fernando Chiang Cabrera, now on the staff of the Instituto de Biología, Universidad Nacional Autónoma de México in Mexico City.

SPIRANTHES CHIANGII M. C. Johnston, sp. nov. Herbae perennae 27--46 cm. altae; radices elongatae tuberosae ad 10 cm. longae, 1 cm. crassae; folia basalia ignota ut videtur fugacia, caulina 2.5--4 cm. longa; inflorescentia moderate densa 50--90-flora 11--25 cm. longa 1--1.5 cm. crassa, internodiis saepe 2--4 mm. longis pilis glandularibus; flores pallidae virides; sepala lanceolata vel sepala lateralia lanceo-linearia 6--7 mm. longa dorsaliter rugulosa basi 3-nervata non decursiva; petala dorsalia oblongo-linearia 6--7 mm. longa; labelum subulatum 6--7 mm. longum omnino inornatum distaliter margine inflexis; rostellum minutum truncatum, ovarium 5--7 mm. longum anguste obovoideum pilis glandularibus; fructus 6--7 mm. longus leviter lateraliter compressus asymmetrico obovato.

TYPE: MEXICO, Coahuila, Sierra de Jimulco, ca. 3 km. north of Mina San José, 25°8' north latitude, 103°13'30" west longitude, ca. 2500 m. alt., mineralized limestone slopes with chaparral of Quercus, etc., 27 September 1972, F. Chiang, T. L. Wendt and M. C. Johnston 9551e (LL, holotype).

Other specimens seen: Coahuila, type locality, Chiang, et al. 9548f (LL); Sierra de la Paila, southwestern quadrant, peak above head of Cañón Corazón del Toro and Mina de la Abundancia, 25°54'30" north latitude, 101°38' west longitude, ca 2100 m. alt., chaparral of Quercus, Vauquelinia, Cercocarpus, etc., on gypsum limestone slopes, 5 November 1972, T. L. Wendt,

F. Chiang and M. C. Johnston 10108a (LL, unicate). Nuevo León, 44 km. northeast of Doctor Arroyo along highway 29, on limestone rocky soil, rare among Agave, also with Juniperus, Hesperaloe, Opuntia, Yucca, etc., 23°59' north latitude, 100°1' west longitude, 1800 m. alt., 9 September 1971, James Henrickson 6605 (LL, unicate).

This rare species is almost confined to the Chihuahuan Desert Region as that region is defined by Johnston. Henrickson 6605 was strictly speaking collected just outside the region near its eastern margin.

Spiranthes chiangii seems to be one of the least "decorated" plants of its genus, in view of the tiny, truncate rostellum and wholly unadorned and unlobed subulate lip. In the treatment of Mexican orchids by Williams (1951) it keys to Spiranthes polyantha Reichenbach filius. But S. polyantha comprises even more delicate nearly glabrous plants with slender, more or less tubular perianth and few flowers in a single loose helix. Spiranthes chiangii appears to be perfectly distinct.

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- Williams, L. O. 1951. The Orchidaceae of Mexico. Ceiba 2: 1--244.

HARTHAMNUS, A NEW GENUS OF MUTISIEAE FROM BOLIVIA

(ASTERACEAE).

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Cabrera (1977) has stated that the largest number of genera of the Mutisieae is concentrated in the tropical Andes of Peru, Bolivia, and north-western Argentina, where there are 31 genera representing all the subtribes. The same author has noted that many genera of the tribe are monotypic and restricted in distribution. Thus, in spite of the extensive studies in the tribe in recent decades, some additional genera are to be expected. One such undescribed genus has recently been collected in the vicinity of Cochabamba in Bolivia by Jeffrey A. Hart, working with the Arnold Arboretum of Harvard University. The genus is named here in honor of the collector.

Harthamnus has a rather distinctive habit, resembling a small Conifer. The genus can be placed in the subtribe Mutisiinae on the basis of the non-villous partially bilabiate corollas and the rounded unfringed tips of the style branches. The aspect of *Harthamnus* is approached by some shrubby species of *Mutisia* such as *M. homoeantha* Wedd. of Bolivia, but all members of the latter genus have plumose pappus setae, and no direct relationship to such species is evident. Technically, the new genus is close to *Lophopappus* which has non-plumose pappus setae and heads that are usually single and terminal. *Lophopappus* differs most significantly in having only 5-8 homogamous bilabiate flowers in the head. The anthers of the latter genus are also paler, the anther appendages have obtuse tips, the leaf bases have distinctive narrow articulated petioles above a pulviniform attachment, the achenes are hispid, and the pappus setae are prominently barbellate at the tip. In *Harthamnus* the heads have central discoid flowers in addition to the marginal bilabiate flowers, the anther thecae and appendages are intensely blackish purple in a manner reminiscent of the anther appendages of *Perezia*, the appendages are truncate apically, the leaf bases have small but distinct broadened appressed bases, the achenes are minutely glanduliferous, and the pappus setae are not more barbellate or tufted at the tips. The new genus seems to also occur in a more moist area along the northeastern escarpment of the Andes in Bolivia, while *Lophopappus* is mostly if not entirely in drier zones to the west and south, ranging from southern Peru to Chile.

The new genus name is a contraction based on the name of the collector, Hart, and the greek word *thamnus*, meaning shrub.

HARTHAMNUS BOLIVIENSIS H. Robinson, gen. et sp. nov.

Plantae fruticosae ca. 1 m altae multo saepe subverticillate ramosae. Caules atro-cinerei teretes evanescentiter dense puberuli sensim inferne corticati. Folia dense spiraliter inserta, petiolis brevibus base subamplexicaulibus imbricatis subpersistentibus; laminae oblanceolatae plerumque 1.2-1.6 cm longae et 0.30-0.35 cm latae base sensim angustiores margine dense puberulo-fimbriatae apice breviter acutae supra et subtus immerse glandulopunctatae obscure trinervatae, nervis secundariis e basis sublongitudinalibus. Capitula solitaria in ramis superioribus brevibus abrupte terminalia ca. 15 mm alta et 7 mm lata; involucria in foliis ramorum superioribus investientia; squamae involucri ca. 15 exteriores semi-foliaceae interiores anguste oblongae vel lineari-lanceolatae ca. 13 mm longae et 2.0-2.5 mm latae apice breviter acutae vel cuneatae margine anguste scariosae dense puberulo-fimbriatae pallidae extus ad medio late viridi-vittatae dense glandulopunctatae. Flores exteriores 5-6; corollae plerumque albae in faucibus purpureae bilabiatae ca. 15 mm longae extus glabrae, tubis cylindraceis ca. 6.5 mm longis, faucibus leniter infundibularibus ca. 1.5 mm longis, ligulis exterioribus anguste oblongis ca. 7.5 mm longis et 1.5 mm latis apice minute trilobatis, lobis interioribus binis linearibus ca. 7.0 mm longis et 0.6 mm latis apice breviter purpureo-tinctis. Flores interiores ca. 7; corollae plerumque albae in faucibus et apicibus lobarum purpureae ca. 15 mm longae actinomorphae extus glabrae, tubis 6.5 mm longis glabris, faucibus leniter infundibularibus ca. 1.5 mm longis, lobis 5 linearibus ca. 7.5 mm longis et 0.6 mm latis; antherae omnes in connectivis et appendicibus purpurascens; thecae antherarum ca. 6 mm longae base longe caudatae, caudis ca. 3 mm longis margine longe fimbriatae in superficiis exterioribus longe papillois, cellulis thecarum oblongis in parietibus transversalibus plerumque 2-noduliferis; appendices antherarum anguste oblongae ca. 1.8 mm longae et 0.4 mm latae apice truncatae; basi stylorum distincte leniter noduliferi; styli superne sensim purpurei; rami stylorum breves truncati ca. 0.5 mm longi et 0.4 mm lati intus omnino stigmatacei margine et extus dense breviter papilliferi. Achaenia prismatica ca. 3.5 mm longa 5-costata minute glandulopunctata, costis in sulcis prominulis; setae pappi sordidae ca. 100 ca. 2-seriatae interiores 10-12 mm longae exteriores tenuiores irregulariter breviores scabridae, cellulis apicalibus argute acutis. Grana pollinis oblonga ca. 65 μ m longa et ca. 50 μ m lata sublaeves.

TYPE: BOLIVIA: Cochabamba: S.E. of Cochabamba, vic. of Rodeo. Rocky slope, slightly grazed. 3500 meters. Fls. white. March 5, 1979. *Jeffrey A. Hart 1739* (Holotype, US; isotype, A).

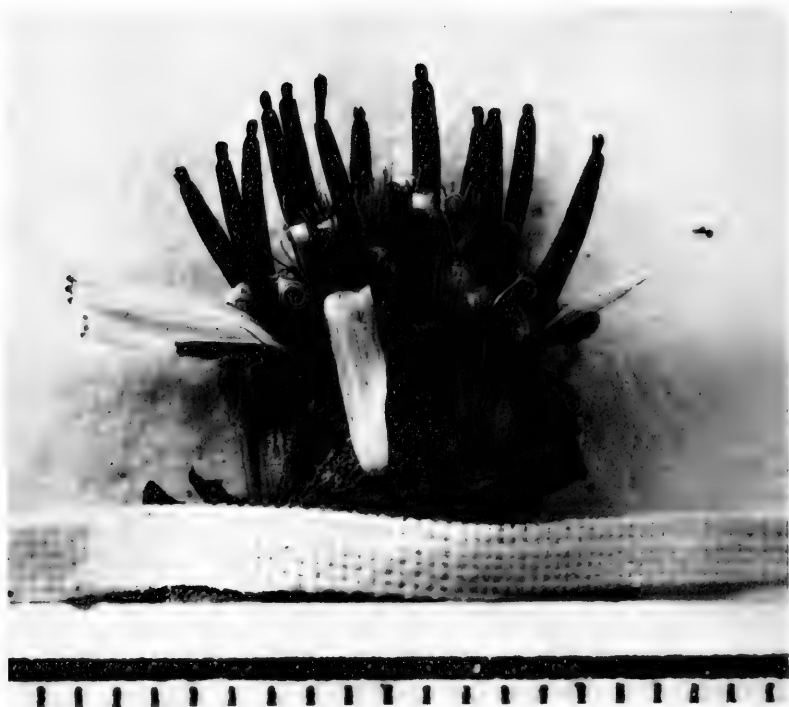
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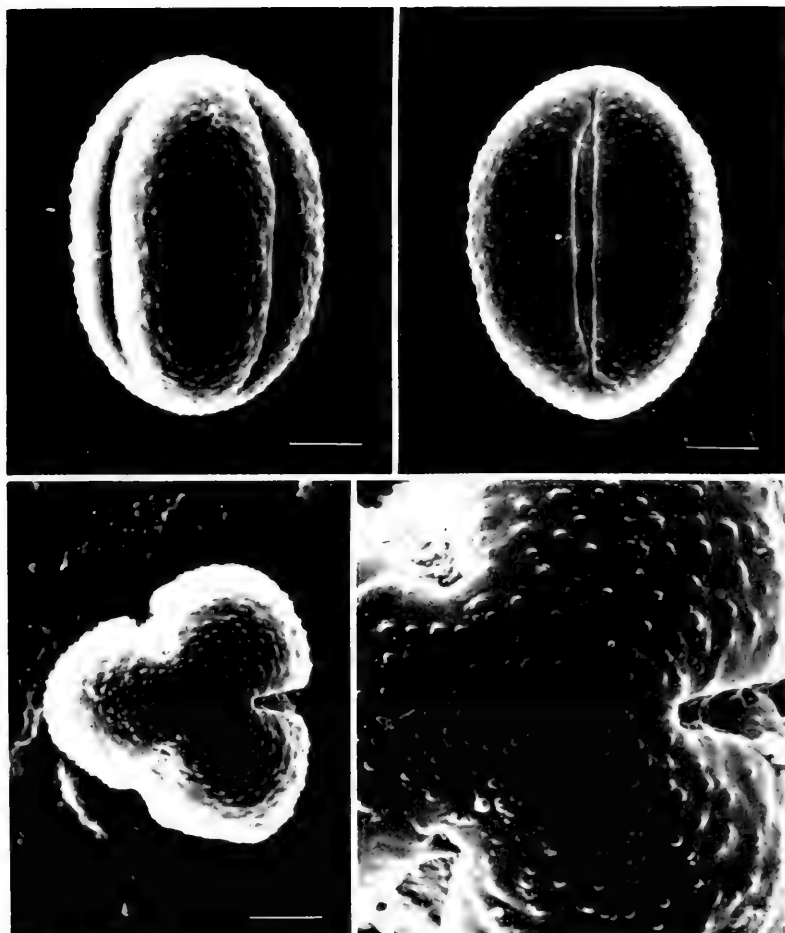


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Harthamnus boliviensis H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Harthammus boliviensis H. Robinson, enlargement of head.



Harthamnus boliviensis H. Robinson, Pollen. Top. Lateral views. Bottom. End views. Lines equal 10 μ m.

STUDIES IN THE HELIANTHEAE (ASTERACEAE). XXIII.

NEW ANDEAN SPECIES OF *VERBESINA* AND *VIGUIERA*.

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The following three species of Andean Heliantheae cannot be matched with previously described members of their genera. The three are described here so that material can be labelled and the names can be available.

Verbesina barclayae H. Robinson, sp. nov.

Plantae fruticosae ca. 1 m altae multo ramosae. Caules teretes leniter striati fulvescentes minute strigulosi. Folia opposita subsessilia, petiolis ca. 1 mm longis dense strigulosi; laminae oblongo-ellipticae plerumque 2.0-3.5 cm longae et 1.0-1.6 cm latae base late cuneatae vel anguste rotundatae margine superne pauce serrulatae apice obtusae vel breviter acutae supra et subtus scabridulae subtus in nervis primariis strigulosi, nervis secundariis pinnatis utrinque ca. 4 arcuatis mediocriter distinctis. Inflorescentiae in ramis elongatis terminales univel pauci-capitatae; pedicellis plerumque 1-3 cm longis dense hispidulis. Capitula late campanulata ca. 10-13 mm alta et 10-15 mm lata. Squamae involucri ca. 25 atro-virides ca. 2-seriatae subaequilongae anguste oblongae 6-9 mm longae et 1.5-2.5 mm latae apice obtusae vel breviter acutae margine et extus dense minute puberulae vel scabridulae. Paleae squamis involucri similes atro-virides apice breviter acutae. Flores radii 10-13 in capitulo fertiles; corollae flavae ca. 21 mm longae, tubis ca. 5 mm longis dense hispidulis, limbis oblongis ca. 16 mm longis et ca. 5 mm latis apice minute inaequaliter trilobatis extus plerumque glabris inferne sparse puberulis; achaenia radii immatura ca. 4 mm longa plerumque in marginem sparse minute spiculifera lateraliter pauce longe setifera; pappus subnullus. Flores disci ca. 40; corollae flavae ca. 7 mm longae, tubis ca. 2 mm longis dense hispidulis, faucibus ca. 3.5 mm longis inferne hispidulis superne glabris, lobis oblongis ca. 1.5 mm longis et 0.9 mm latis intus ad marginem dense papillosi extus sparse breviter setiferis; filamenta in parte superiore ca. 0.4 mm longa; thecae ca. 2.5 mm longae nigrae; appendices antherarum ca. 0.6 mm longae et 0.4 mm latae pallidae extus glabrae; achaenia ad 5 mm longa et 2 mm lata superne sparse minute spiculifera lateraliter pauce longe setifera; pappus plerumque biaristatus, aristis ad 3 mm longis. Grana pollinis ca. 35 μ m in diam.

TYPE: ECUADOR: Azuay: 30 km S of Cumbe on the road to

Saraguro at an elevation of 9800 ft. Shrub 1 m tall. Florets yellow; anthers black. 26 Jan. 1979. *R. M. King & F. Almeda 7809* (Holotype, US). PARATYPE: ECUADOR: Azuay-Loja: Nudo de Cordillera Occidental y Cordillera Oriental entre Oña y Rancho Ovejero. Between Cumbe (2704 m) and cerca 2800 m., on south-bound road. On dry slopes with mostly low shrubs and ferns. Herb to 0.5 m tall. Leaves rough both sides, to 3.5 X 1.5 cm. Stems red brown, heads single on stem, involucre green-hairy, bracts rounded. Ligul. fls. yellow, wide; disc fls. yellow. 1-2 Aug. 1959. *H. G. Barclay & P. Juaquibioy 8450* (US).

The distinctions of the species are discussed below under *Verbesina kingii* new species. The type specimen of *Verbesina barclayae* has disk achenes with aborted aristae.

Verbesina kingii H. Robinson, sp. nov.

Plantae fruticosae usque ad 1.5 m altae paucae ramosae. Caules teretes leniter striati fulvescentes minute puberulae. Folia opposita sessilia; laminae oblongo-ellipticae 5-13 cm longae 0.9-3.3 cm latae base leniter auriculatae margine integrae apice argute acutae supra valde scabrae subtus pilosae et in nervis hirsutae, nervis secundariis pinnatis. Inflorescentiae in ramis elongatis terminales corymboso-paniculatae; pedicellis 5-11 mm longis dense puberulis. Capitula 8-9 mm alta ca. 8 mm lata; squamae involucri ca. 25 omnino atro-virides ca. 2-seriatae subaequilongae 5-7 mm longae et 1.5-1.8 mm latae apice obtusae vel breviter acutae margine et extus dense scabridulae; paleae squamis involucri similes apice flavescentes acutae vel vix acuminatae. Flores radii ca. 12 in capitulo; corollae flavae ca. 10 mm longae, tubis ca. 2.5 mm longis extus dense puberulis, limbis obovatis ca. 8 mm longis et 3.5 mm latis apice minute trilobatis extus parce puberulis; achaenia superne sparse puberula; pappus nullus. Flores disci ca. 45; corollae flavae ca. 5 mm longae, tubis ca. 1.5 mm longis extus dense puberulis, faucibus et lobis extus sparse puberulis, lobis ca. 0.7 mm longis et latis; filamenta in parte superiore ca. 0.3 mm longa; thecae ca. 1.8 mm longae nigrae; appendices antherarum ca. 0.4 mm longae base nigrae; achaenia immatura; aristae pappi ca. 2 mm longae. Grana pollinis ca. 27 μ m diam.

TYPE: ECUADOR: Azuay: along the road to Loja, ca. 6 kms generally SE of Cumbe. Elev. ca. 9600 ft. Uncommon shrubs up to 1½ meters tall, flowers yellow. 4 Feb. 1974. *R. M. King 6700* (Holotype, US).

The two new species both share a general shrubby habit with opposite oblong to elliptical leaves and inflorescences of terminal heads single or in small corymbose panicles. Closest relatives seem to be *Verbesina elegans* H.B.K. of Colombia and *V. (Lipactinia) laevis* Blake from Chachapoyas, Peru. The Colombian species was placed in sect. *Saubinetia* by Blake (1930), and it has alternate leaves, coarse pubescence on the involucre bracts, 6-7 rays and ca. 40 disk flowers in the heads, and dark

anther appendages. The peruvian species is more like the two new species in its opposite leaves, but it lacks rays, having 10-flowered discoid heads. Of the two new species, *V. barclayae* is distinct by the more branched habit, the generally smaller, more serrulate, slightly petiolate, non-auriculate leaves, the scabridulous rather than pilosulous lower leaf surface, the larger often single heads, and the paler anther appendages.

Viguiera bishopii H. Robinson, sp. nov.

Plantae suffruticosae ca. 1 m altae laxe ramosae. Caules brunnescentes antrorse appresse strigosi et sparse contorte puberuli. Folia alterna, petiolis plerumque 2-5 mm longis subalatis margine dense pilosis subtus dense strigulosis; laminae lanceolatae plerumque 6-15 cm longae et 1.0-2.5 cm latae base cuneatae margine remote serrulatae vel subintegrae apice anguste acutae supra sparse antrorse strigulosae subtus strigosae in nervis secundariis basilaribus intramarginalibus valde ascendentibus trinervatae. Inflorescentiae laxe ramosae, ramis ultimis plerumque 5-20 cm longis superne sensim dense strigosis vel subhirsutis. Capitula late campanulata ca. 1 cm alta et ca. 2 cm lata. Squamae involucri ca. 25 triseriatae plerumque ellipticae vel obovatae apice longe acuminatae margine inferne dense pilosofimbriatae extus inferne carnosae 2-4-costatae superne herbaceae perdense minute strigulosae; paleae plerumque late scariosae apice obtusae vel minute apiculatae breviter rubro-tinctae et dense pilosulae. Flores radii 13-15 in capitulo steriles; corollae flavae, tubis subdistinctis ca. 1 mm longis dense puberulis, limbis oblongis ca. 17 mm longis et 6.5 mm latis extus minute multo glandulo-punctatis plerumque in nervis minute puberulis; achaenia radii longi-setifera; pappus irregulariter squamiformis ad 2 mm longus. Flores disci ca. 130 in capitulo; corollae sordido-flavae ca. 5.5 mm longae, tubis ca. 1 mm longis extus sparse minute strigulosis, faucibus 4.5 mm longis tubiformibus superne leniter infundibularibus extus inferne dense strigulosis, lobis ovato-triangularibus ca. 1 mm longis intus ubique papillosis; filamenta in paribus inferioribus laevia in partibus superioribus ca. 0.5 mm longa; thecae ca. 2.3 mm longae nigrescentes; appendices antherarum ovatae ca. 0.7 mm longae et 0.5 mm latae extus glanduliferae; rami stylorum exappendiculati extus superne dense puberuli; achaenia disci valde compressa ad 4.2 mm longa et 1.8 mm lata longe dense setifera; pappus biaristatus ad 5.5 mm longus, squamis irregularibus ad 2.5 mm longis. Grana pollinis ca. 30 μ m in diam.

TYPE: BOLIVIA: Cochabamba: 5 kms from Parotani, on road to Oruro. 9000 ft. Shrub to 1 m tall, flowers yellow. 2 Feb. 1978. *R. M. King & L. E. Bishop 7574* (Holotype, US). PARATYPE:

BOLIVIA: Cochabamba: near Parotani on the road to Oruro. 8200 ft. Herb to 1 m tall, flowers yellow. 2 Feb. 1978. *R. M. King & L. E. Bishop 7570* (US).

Viguiera bishopii is one of the exappendiculate species

which may eventually be placed in a separate genus. The species would key to the series *Aureae* of Blake (1918), and it is most distinct from the related species by the spreading strongly acuminate involucre bracts having pale densely pubescent bases.

The following new combination is needed for the revised edition of the National List of Scientific Plant Names. Nordenstam (1977) has established the priority of *Psathyrotopsis* Rydb. over *Pseudobartlettia* Rydb., but the necessary combination was not made.

Psathyrotopsis scaposa (A.Gray) H. Robinson, comb. nov.

Psathyrotes scaposa A.Gray, Pl. Wright., Smithson. Contrib. Knowl. 5 (6): 100. 1853.

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_____. 1930. Notes on certain type specimens of American Asteraceae in European herbaria. Contrib. U. S. Nat. Herb. 26 (5): 227-263, i-ix.

Nordenstam, B. 1977. Chapter 29. Senecioneae and Liabeae—systematic review. In Heywood et al., eds. The Biology and Chemistry of the Compositae. 799-830.

A NEW SPECIES OF *PHILONOTIS* FROM BOLIVIA

(MUSCI: BARTRAMIACEAE)

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Specimens of mosses collected by F. J. Hermann in Bolivia in 1972 have proven to contain a few examples of less well-known entities including the supposedly endemic genera *Erythrophyllopsis* and *Leptopterygynandrum*. One of the specimens is a Bartramiaceous moss with some unique details of leaf structure which cannot be matched with any previously known species. The species is easily recognizable, and it is therefore described here, but it is hoped that fruiting material will be found by future collectors.

The new species has the form of papillosity or prorulosity that is common in *Philonotis* and related genera in the Bartramiaceae. The general aspect is somewhat like *Conostomum*, but there is no ranking of leaves as is common in that genus. As far as can be seen, the species falls within the great variation of the genus *Philonotis*, but ultimate positioning awaits examination of fruiting material.

The precise form of prorulosity in the new species seems to be unique among American members of *Philonotis*, having papillae at the upper ends of the cells on both the upper and lower surfaces of the leaves. A still more distinctive feature of the species is the rows of cells on the backs of the leaves forming about three ribs on each side of the costa. These ribs of cells on the back of the lamina are only one cell wide below, but become two cells wide near midleaf where they terminate.

The species is named for the collector, Frederick J. Hermann.

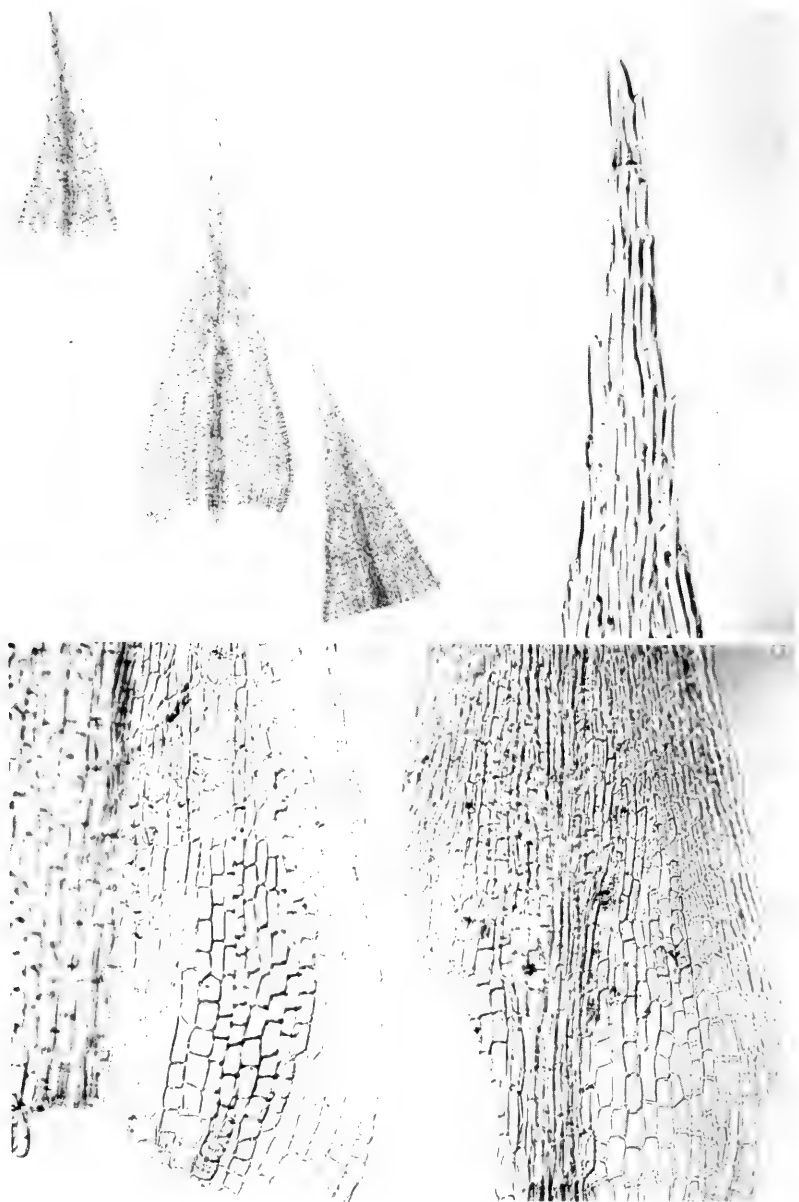
PHILONOTIS HERMANNII H. Robinson, sp. nov.

Plantae caespitosae flavo-virides inferne fuscescentes. Caules ca. 1 cm alti extus aurantiaci. Folia in sicco erecta appressa madido erecto-patentia ovato-lanceolata ca. 1.5 mm longa et inferne 0.5 mm lata superne subulata apice anguste pungentia margine anguste recurvata; costa percurrent inferne ca. 45-50 μ m lata; laminae in plicis longitudinalibus bistratosae, plicis utrinque ca. 3 inferne uniseriatis superne saepe sensim biseriatis, cellulis alaribus subquadratis vel breviter oblongis ca. 12 μ m latis, cellulis inferioribus interioribus oblongis ca. 10-12 μ m latis et plerumque 22-37 μ m longis, cellulis superioribus plerumque anguste oblongis ca. 8-10 μ m latis et 22-40 μ m longis in extremis apicalibus supra et subtus valde prorulosis. Gametangia et sporocarpia ignota.

TYPE: BOLIVIA: Cochabamba: Vertical face of roadside cut near Liriuni Aguas Termales Hotel, NW slope of Mt. Tunari, alt. ca. 2700 m, 28 km NW. Cochabamba. Dec. 27, 1972. *F.J. Hermann* 25735 (Holotype, US).



Philonotis hermannii H. Robinson, Holotype, United States National Herbarium. Top. Habit of plant. Bottom. Cross-section of leaf. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



Philonotis hermannii H. Robinson. Top left. Leaves. Top right. Leaf tip showing prorulose cells. Bottom left and right. Lower leaf laminae showing extraplanar rows of cells.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CXC.

A NEW GENUS *SANTOSIA*.

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The State of Bahia in Brasil is an area notable for many endemic genera. Some such endemics are phyletically isolated, while many others simply represent extreme developments of widely distributed groups. A genus of the latter type is a member of the Critonioid series of the Eupatorieae related to *Koanophyllon*, named here as *Santosia*. We take great pleasure in naming the new genus and species for Sr. Talmon S. dos Santos. Sr Santos, a collector at the Centro de Pesquisas do Cacau at Itabuna, was of great help to the senior author during the last year in collecting many new species and genera of Asteraceae in Bahia.

Material of the new genus has been found under the name *Eupatorium* aff. *triplinerve* Vahl, reflecting the strongly trinervate nature of the leaves. The Vahl species, however, is a completely different plant, being an *Ayapana* first described from the West Indies and being widely introduced as a medicinal plant. The new genus, in contrast, is closely related to *Koanophyllon*, showing the habit, involucre, and achene types common in that genus. The more than 100 species of *Koanophyllon* (King & Robinson, 1975a) all possess a distinctive corolla form with a scarcely narrowed basal tube, short triangular lobes, and a dense cluster of glands on the outer surface of the lobes. It is the corolla form that provides the only workable character for the genus *Koanophyllon* in its present broad interpretation. The new genus has a corolla form differing by its very long narrow lobes that have few or no noticeable glands on the outer surface.

SANTOSIA TALMONII R. M. King & H. Robinson, gen. et sp. nov.

Plantae volubiles ad 3-4 m altae mediocriter ramosae. Caules atro-brunnescentes juniores dense minute puberuli. Folia opposita, petiolis 6-15 mm longis tenuis; laminae ovatae vel ovato-ellipticae plerumque 4-9 cm longae et 1.5-4.0 cm latae base obtusae vel rotundatae in extremis vix acuminatae trinervatae margine integrae apice leniter breviter anguste acuminatae supra et subtus glabrae supra in nervis prominulae in nervulis parum insculpatae subtus in nervis prominentes in nervulis prominulae, nervis secundariis valde ascendentibus. Inflorescentiae dense thyrsoid-eo-paniculatae, ramis dense puberulis vel subtomentosis, ramis ultimis 0.5-7.0 mm longis. Capitula ca. 8 mm alta; squamae involucri brunnescentes leniter subimbricatae ca. 13 exteriores ovatae 2.0-3.5 mm longae et ca. 1.5 mm latae persistentes mature

patentes apice acutae recurvatae extus glabrae vel glabrescentes 3-4-striatae interiores lanceolatae vel lineares ad 5 mm longae et 0.8-1.0 mm latae erectae facile deciduae. Flores 8-10 in capitulo. Corollae albae? anguste infundibulares ca. 5.0-5.5 mm longae, tubis cylindraceutis ca. 2.5 mm longis extus glabris, faucibus ca. 1.5 mm longis glabris, lobis oblongis ca. 1.2 mm longis et 0.5 mm latis extus sparse minute glanduliferis, glandulis minute capitatis; filamenta in partibus superioribus cylindraceuta ca. 0.25 mm longa, cellulis inferioribus quadratis in parietibus vix vel non ornatis; thecae antherarum ca. 1.5 mm longae, cellulis endothecialibus subquadratis; appendices antherarum oblongo-ovatae longioribus quam latioribus ca. 0.5 mm longae et 0.25 mm latae; basi stylorum glabri non noduliferi; appendices stylorum lineares vel subfiliformes minute leniter papillosae extus subplanatae. Achaenia prismatica 5-costata ca. 2.5 mm longa superne plerumque in costis sparse breviter setifera et paucis puberula base distincte subabrupte angustiora; carpopodia perbrevia in sicco subdisciformia, cellulis ca. 4-seriatis subquadratis ca. 17 μ m latis; setae pappi ca. 20 plerumque 4.0-4.5 mm longae apice in setis longioribus leniter latiores margine dense scabridulae extus sublaeves. Grana pollinis in diametro ca. 22 μ m valde spinulosa.

TYPE: BRASIL: Bahia: Porto Seguro - BR-5, K.18. Planta de orla de mata secundaria. 26-8-1961. A. P. Duarte 6036 (Holotype, RB; isotype US). PARATYPE: BRASIL: Bahia: Município de Santa Cruz de Cabralia. Old road to Santa Cruz de Cabralia between the Reserva Ecologica *Paubrasil*, 5-7 kms NE of Reserva, ca. 20 kms NW of Porto Seguro. Region of tropical wet forest, forest devastated. Elev. ca. 100 meters. Abundant vines in tree, ca. 3-4 meters above ground, flowers very young, white? July 5, 1979. R. M. King, S. A. Mori, A. M. de Carvalho & A. Euponio 7985 (CEPEC, US).

The scandent habit of the species is rather distinctive, superficially resembling members of the genus *Mikania*. The related *Koanophyllon* consists mostly of erect or laxly spreading shrubs, with a few species, including the type, *K. tinctorium* Arruda da Camara of Brasil, being subscandent.

A few new combinations are appended here so that the names will be available for reports and publications. Two of the combinations are needed for use in the revised edition of the National List of Scientific Plant Names.

AGERATINA SHASTENSIS (Taylor & Stebbins) R. M. King & H. Robinson, comb. nov. *Eupatorium shastense* Taylor & Stebbins, Madroño 25: 218. 1978. The original authors compared the species to members of *Ageratina* and cited a chromosome number of $n=17$ that is common in that genus. Examination of the type confirms the relationship.

AUSTROEUPATORIUM DECEMFLORUM (DC.) R. M. King & H. Robinson,
comb. nov. *Eupatorium decemflorum* DC., Prodr. 5: 154. 1836.
We have previously placed this name, based on a peruvian type, in
the synonymy of *A. inulaefolium* (H.B.K.) K. & R. (King & Robinson,
1975b), but examination of a type photograph shows the species
that has been known under the name *A. mapiriense* (hieron.) K. & R.,
described from Bolivia and ranging north into Ecuador.

EUPATORIADELPHUS MACULATUS (L.) K. & R. var. BRUNERI (A. Gray) R.
M. King & H. Robinson, comb. nov. *Eupatorium bruneri* A. Gray,
Syn. Fl. N. Am. 1 (2): 96. 1884.

KOANOPHYLLON CONGLOBATUM (DC.) R. M. King & H. Robinson, comb.
nov. *Eupatorium conglobatum* DC., Prodr. 5: 165. 1836. This
Bahian species has not been placed in *Koanophyllon* previously
because of a somewhat anomalous aspect of the inflorescence, but
further study indicates that it should be included.

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R. W. Schery, eds., Flora of Panama. Ann. Missouri Bot.
Gard. 62: 888-1004.



JARDIN BOTANIQUE DE LA FACULTE DE MEDECINE

254077

Santosia talmonii R. M. King & H. Robinson, Holotype, United States National Herbarium. Habit and enlargement of heads. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

NEW COMBINATIONS IN *TETRANEURIS* GREENE

(HELIANTHEAE, ASTERACEAE).

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Since I am now recognizing *Tetraneuris* Greene as a genus distinct from *Hymenoxys* Cass. the following 6 new combinations are necessary.

These are being published now so they will be available for the revised edition of the National List of Scientific Plant Names being prepared by the Smithsonian for the Soil Conservation Service of the U. S. Department of Agriculture.

Tetraneuris acaulis var. *arizonica* (Greene) K.F.Parker, comb. nov.
Tetraneuris arizonica Greene, Pittonia 3: 266. 1898.

Tetraneuris brandegei (Porter ex A.Gray) K.F.Parker, comb. nov.
Actinella brandegei Porter ex A.Gray, Proc. Amer. Acad. 13: 373. 1878.

Tetraneuris grandiflora (Torr. & Gray) K.F.Parker, comb. nov.
Actinella grandiflora Torr. & Gray, Bost. Jour. Nat. Hist. 5: 110. 1845.

Tetraneuris scaposa (DC.) Greene var. *argyrocaulon* (K.F.Parker) K.F.Parker, comb. nov. *Hymenoxys scaposa* var. *argyrocaulon* K.F.Parker, Phytologia 20 (3): 192. 1970.

Tetraneuris scaposa var. *linearis* (Nutt.) K.F.Parker, comb. nov.
Actinella scaposa var. *linearis* Nutt., Trans. Amer. Phil. Soc. II. 7: 379. 1841.

Tetraneuris turneri (K.F.Parker) K.F.Parker, comb. nov. *Hymenoxys turneri* K.F.Parker, Phytologia 20 (3): 192. 1970.

NOTES ON NEW AND NOTEWORTHY PLANTS. CXXXVII

Harold N. Moldenke

AEGIPHILA RACEMOSA var. *CORDATIFOLIA* Mold., var. nov.

Haec varietas a forma typica speciei laminis foliorum basaliter perspicue profundeque cordatis recedit.

This variety differs from the typical form of the species chiefly in having its leaf-blades basally conspicuously and deeply cordate. It is also noteworthy that corollas in wide-open condition persist in large numbers among maturing and mature fruits almost enclosed by very much incrassate and enlarged fruiting-calyxes.

The type of the variety was collected by Thomas B. Croat (no. 20738) at Casaeria on the Amazon River, Loreto, Peru, on September 25, 1972, and is deposited in the United States National Herbarium at Washington. The collector describes the plant as a shrub to 1.5 m. tall and the fruit as bright-orange in color.

ALOYSIA GENTRYI Mold., sp. nov.

Frutex fruticosus anguste rectus aromaticus 1--2 m. altus; ramis gracilibus griseis subglabris; ramis juvenalibus dense puberulis; internodiis valde abbreviatis; foliis decussato-oppositis numerosis; petiolis perabbreviatis ca. 1 mm. longis densissime pubescentibus; laminis foliorum anguste ellipticis 2--4 cm. longis 8--12 mm. latis apicaliter acutis vel subacutis marginaliter serrulatis basaliter acutis vel subcuneatis supra dense strigosis rugosis, subtus dense pubescentibus; inflorescentiis axillaribus abbreviatis plerumque 1--3-floris; bracteis ellipticis ubique densissime griseo-pubescentibus; fructibus valde longivillosis.

A bushy, narrowly erect, aromatic shrub, 1--2 m. tall; stems and branches slender, obscurely rounded-tetragonal or subterete, glabrescent, light-gray; youngest branchlets very slender and very densely puberulent; internodes very much abbreviated; leaves decussate-opposite, numerous, crowded, aromatic; petioles much abbreviated, about 1 mm. long, very densely grayish-pubescent; leaf-blades narrowly elliptic, chartaceous, 2--4 cm. long, 8--12 mm. wide, apically acute or subacute, marginally regularly serrulate (except basally), basally acute or subcuneate, densely appressed-strigose above with antrorse hairs, plainly rugose with impressed venation-reticulation, very densely short-pubescent beneath; inflorescence axillary, much abbreviated, usually 1--3-flowered in a short raceme; bracts elliptic, very densely grayish-pubescent on both surfaces; corolla very small, yellow; ovary and fruit conspicuously long-hispid with stiff wide-spreading hairs.

The type of this species was collected by Howard Scott Gentry (no. 14408) -- in whose honor it is named -- on granitic slopes and bajada with thorn forest and open grassland, at 100--800 feet altitude, at Los Cerritos, about 40 miles south of Navojoa, Sonora, Mexico, between October 1 and 3, 1954, and is deposited in my per-

sonal herbarium. The collector notes that the minute, inconspicuous, yellow flowers dry blackish and that the shrub is found only on or about postinsular cerritos. It "is, I believe, a postinsular endemic. It is known only from low granite hills, which appear to have been islands in the Gulf of California for a long time in the Tertiary Period."

PETREA MORII Mold., sp. nov.

Frutex scandens; ramis tetragonis usque ad fere 1 cm. diametro griseo lenticellato; foliis decussato-oppositis magnitudine per-variabilibus; laminis ellipticis subcoriaceis 10--35 cm. longis 5.5--16.5 cm. latis ubique scabris apicaliter breviter acuminatis marginaliter integris basaliter rotundatis supra glabris subtus subglabris, venis subtus parce puberulis; petiolis percrassis brevissimis in sicco corrugatis 3--5 mm. longis; inflorescentiis racemosis in statu maturo ca. 25 cm. longis 9 cm. latis ubique densiuscule puberulis pilis longioribus interspersis; pedicellis maturis elongatis arcte divaricatis 2--3/5 cm. longis ad apicem in capito ampliatis; calyce fructifero perincrassato ca. 1 cm. longo 8 mm. lato extus puberulento-piloso; sepalis fructiferis ellipticis ca. 2.5 cm. longis 1 cm. latis apicaliter subacutis ubique parce pilosulis.

Liana; branches tetragonal, to 1 cm. in diameter at the nodes, grayish, somewhat ridged, prominently lenticellate; branches similar but much more slender, densely short-puberulent throughout; leaves decussate-opposite, very variable in size, large and small pairs apparently alternating, very short-petiolate; petioles very heavy, at maturity apparently only 3--5 mm. long, irregularly corrugate in drying; leaf-blades broadly elliptic or elliptic, subcoriaceous, scabrous on both surfaces, 10--35 cm. long, 5.5--16.5 cm. wide, apically short-acuminate, marginally entire, basally broadly-rounded, glabrous above, subglabrous beneath except for the somewhat pilose-puberulent larger venation; inflorescence solitary, racemose, in fruit ca. 25 cm. long and 9 cm. wide, distantly many-fruited; peduncles, rachis, and petioles rather densely puberulent with scattered much longer hairs interspersed, the pedicels in fruit much longate, very slender, divaricate at right angles to the rachis, 2--3.5 cm. long, capitately amplate at the apex; fruiting-calyx greatly incrassate and enlarged, ca. 1 cm. long and 8 mm. wide, externally puberulent and pilose, the wings elliptic, ca. 2.5 cm. long, 1 cm. wide, apically subacute, rather sparsely and obscurely pilosulous on both surfaces; flowers not seen.

The type of this species was collected by S. Mori and J. Kal-lunki (no. 5521) in a tropical wet forest along the El Llano to Carti road 24.5--25 km. from the Inter-American Highway near the continental divide, San Blas, Panama, on April 12, 1975, and is deposited in the United States National Herbarium at Washington. The collectors describe the fruiting-calyx as lavender in color.

SPHENODESME TRIFLORA var. *CLEMENSORUM* (Mold.) Mold., stat. nov.

Sphenodesme clemensorum Mold., Phytologia 4: 368. 1953.

VERBENA BIPINNATIFIDA var. *BREVISPICATA* (Umber) Mold., comb. nov.
Glandularia bipinnatifida var. *brevispicata* Umber, System. Bot. 4: 89. 1979.

VERBENA CHIRICAHENSIS (Umber) Mold., comb. nov.
Glandularia chiricahensis Umber, System. Bot. 4: 92--93. 1979.

VERBENA POLYANTHA (Umber) Mold., comb. nov.
Glandularia polyantha Umber, System. Bot. 4: 98. 1979.

VERBENA VERECUNDA (Umber) Mold., comb. nov.
Glandularia verecunda Umber, System. Bot. 4: 99--100. 1979.

PAEPALANTHUS ALMASENSIS Mold., sp. nov. Plate 1

Herba rosulata erecta 35 cm. alta; foliis caespitosis griseo-
viridibus gramineis 2--3.3 cm. longis 1.5--2 mm. latis plusminus-
ve patenti-pilosis apiculitatis acutis; vaginis arcte adpressis
4--7 cm. longis densiuscule patenteque hispidulis, pilis tenuibus
albidis, in statu fructifero glabrescentibus nigrescentibus;
pedunculis gracilibus 25--35 cm. longis subteretibus in statu
juventute densissime albo-villosis, pilis arcte adpressis reflex-
is, in statu senectute glabriusculis; capitulis hemisphaericis
1.2--1.5 cm. latis; bracteis involucrentibus ellipticis atro-
brunneis vel nigrescentibus ca. 5 mm. longis ca. 2 mm. latis dor-
so glabrato margine irregulariter ciliatis apicaliter parce
pilosis.

An erect rosulate herb to about 35 cm. tall; leaves all basal,
cespitose, gray-green, grass-like, 2--3.3 cm. long, 1.5--2 mm.
wide, apically acute, more or less deciduously spreading-pilose
throughout; sheath closely appressed to the peduncle, 4--7 cm.
long, the apical lobe lanceolate and about 6 mm. long, in the
young state rather densely spreading-hispidulous with long,
slender, whitish hairs, in the fruiting stage glabrescent and
nigrescent; peduncles slender, 25--35 cm. long, subterete, not
sulcate nor angled, in the young state very densely white-villous
with closely appressed and reflexed hairs, in the fruiting stage
glabrescent; heads hemispheric, 1.2--1.5 cm. wide in fruit; in-
volucral bracts narrow-elliptic, about 5 mm. long and 2 mm. wide,
the outermost smallest, dark-brown or nigrescent, dorsally glab-
rous except for the pilosulous apex, marginally inconspicuously
and irregularly ciliolate; for floral characters see accompany-
ing illustration.

The type of this species was collected by R. M. Harley, S. J.
Mayo, R. M. Storr, T. S. Santos, and R. S. Pinheiro (Harley
19768) in a region of sandstone, metamorphic, and quartzite rock
outcrops with associated marsh and damp flushes, on the lower
northeast slopes of the Pico das Almas, about 25 km. west-north-
west of the Vila de Rio de Contas, Serra das Almas, at approxi-
mately 41°57' W., 13°33' S., at 1500 m. altitude, Bahia, Brazil,
on March 20, 1977. The collectors note: Erect herb to ca. 35
cm. Leaves grey-green with spreading hairs. Basal sheath of
culm green, culm silvery-grey. Involucral bracts pale brown with

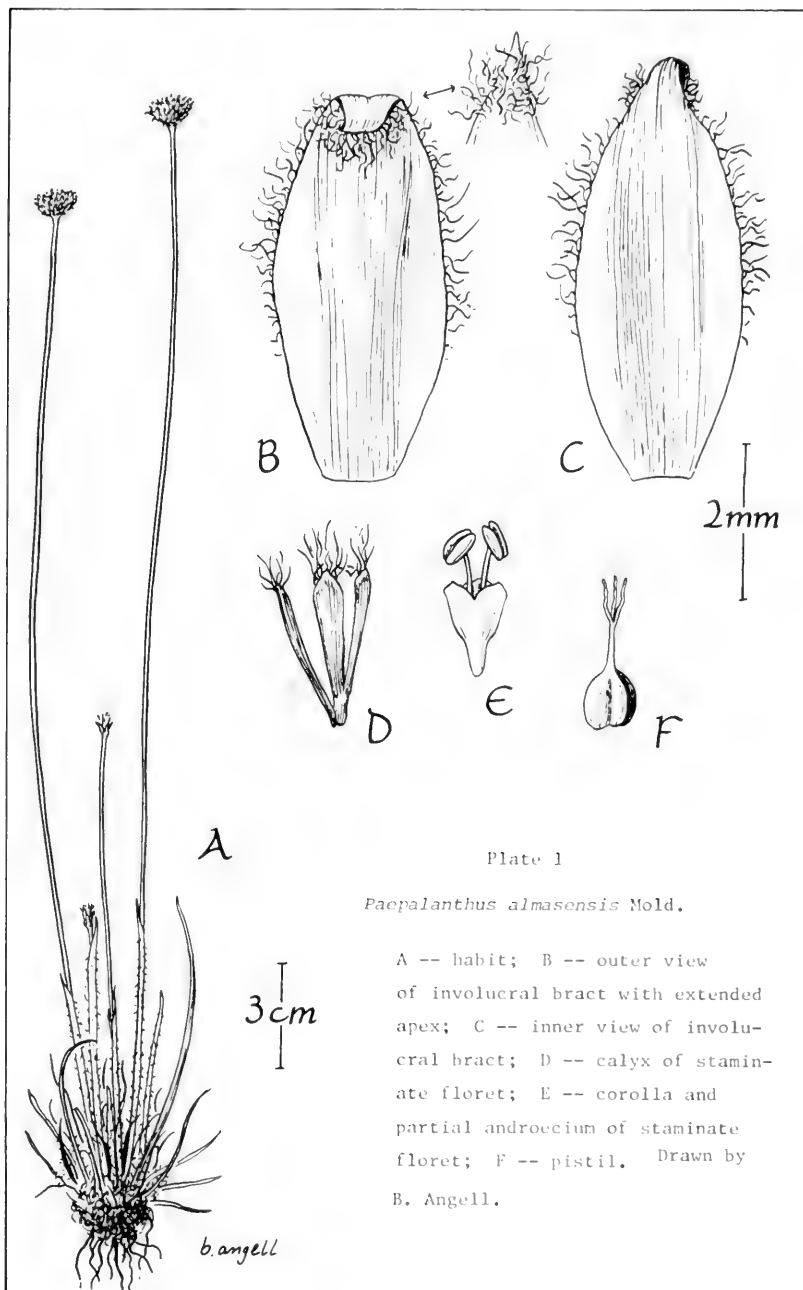


Plate 1

Paepalanthus almasensis Mold.

A -- habit; B -- outer view of involucral bract with extended apex; C -- inner view of involucral bract; D -- calyx of staminate floret; E -- corolla and partial androecium of staminate floret; F -- pistil. Drawn by B. Angell.

darker recurved tips."

PAEPALANTHUS CONTASENSIS Mold., sp. nov.

Plate 2

Herba rosulata; foliis caespitosis graminaceis 3--4 cm. longis 1.5--2 mm. latis subtus margineque dense albo-villosis glabrescentibus; vaginis gracilibus arcte adpressis 4--6.5 cm. longis dense albo-villosis, apice lanceolato-fissis; pedunculis gracillimis tricostatis 15--29 cm. longis glabris flavidis nitidis; capitulis hemisphaericis ca. 1 cm. latis; bracteis involucrentibus lanceolatis ca. 4 mm. longis 1.5 mm. latis extus irregulariter longipilosis atro-brunneis apicaliter acutis.

A rosulate herb; leaves basal, cespitose, grass-like, 3--4 cm. long, 1.5--2 mm. wide, slightly recurved and apically acute, densely white-villous beneath and along the margins when young, later glabrescent; sheaths closely appressed to the peduncle, slender, 4--6.5 cm. long, densely white-villous throughout, split at the apex and the lobe lanceolate, about 5 mm. long, tapering to the apex; peduncles very slender, 3-costate and 3-sulcate, 15--29 cm. long, yellowish, glabrous, shiny; heads hemispheric; involucrel bracts lanceolate, very dark-brown, about 4 mm. long and 1.5 mm. wide, with a prominent midrib, apically acute, irregularly long-pilose on the back and margins; for staminate floral characters, see accompanying illustration; pistillate florets not seen.

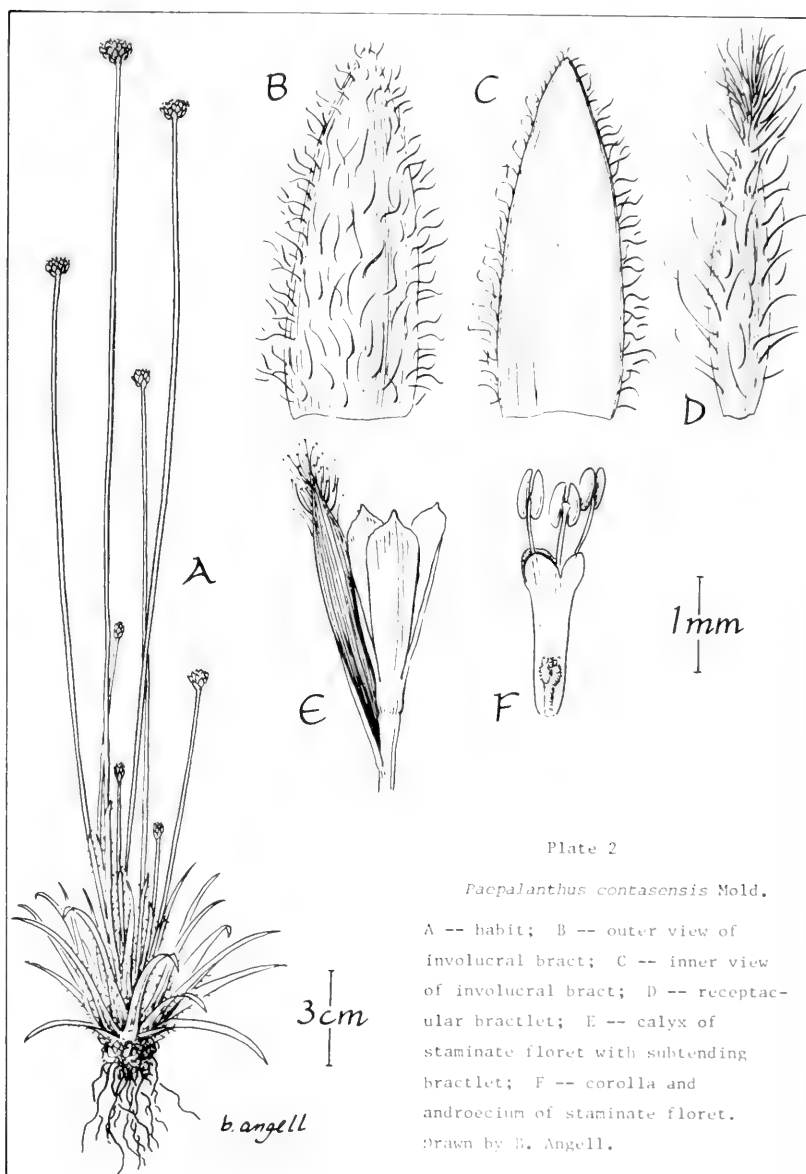
The type of this species was collected by R. M. Harley, S. J. Mayo, R. M. Storr, T. S. Santos, and R. S. Pinheiro (*Harley 1990*) in a region of sandstone rock outcrops with a small area of disturbed marsh at their base and a nearby river with lush vegetation along its rocky margins, at an altitude of about 1200 m., about 1 km. south of the small town of Mato Grosso on the road to Vila do Rio de Contas, Serra do Rio de Contas, Bahia, Brazil, on March 24, 1977. The collectors note: "Rosette herb with grey-green leaves. Involucrel bracts dark. Flowers off-white."

PAEPALANTHUS HARLEYI Mold., sp. nov.

Plate 3

Herba rosulata ca. 40 cm. alta; foliis linearibus 2--3 cm. longis glabris irregulariter adscendentibus; vaginis gracillimis arcte adpressis multistriatis tortis atro-brunneis vel nigris 4--4.5 cm. longis subglabris vel minutissime puberulis apicaliter fissis; pedunculis gracillimis subteretibus paulo tortis 30--39 cm. longis inconspicue adpresso-strigosis, pilis antrorsis; capitulis parvis obovatis ca. 8 mm. diametro; bracteis involucrentibus oblanceolatis vel ellipticis atro-brunneis vel nigris apicaliter acutis apicem versus dorso albido-pilosis.

A rosulate herb to about 40 cm. tall; leaves basal, cespitose, linear, 2--3 cm. long, glabrous, irregularly ascending or somewhat recurved; sheaths very slender, closely appressed to the peduncle, twisted, very dark-brown or blackish throughout, 4--4.5 cm. long, subglabrous or microscopically puberulous, split at the apex, the blade lanceolate, erect, apically acuminate; peduncles very slender, subterete, slightly twisted, 30--39 cm. long, inconspicuously adpresso-strigose with antrorse whitish hairs; heads small, obovate, about 8 mm. in diameter; involucrel bracts



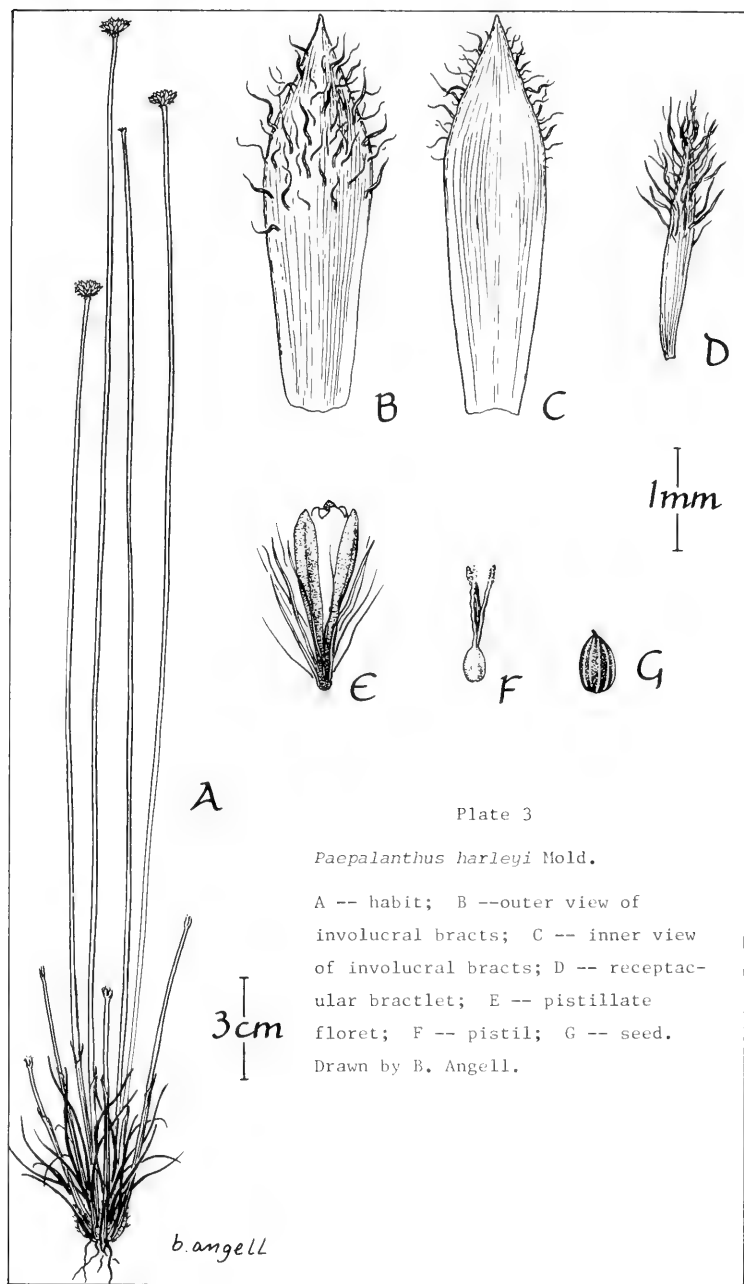


Plate 3

Paepalanthus harleyi Mold.

A -- habit; B -- outer view of
involucral bracts; C -- inner view
of involucral bracts; D -- receptac-
ular bractlet; E -- pistillate
floret; F -- pistil; G -- seed.

Drawn by B. Angell.

oblanceolate or elliptic, dark-brown or blackish, apically acute, dorsally more or less white-pilose toward the apex, the lower ones much smaller and recurved; staminate florets not seen; for pistillate floret characters see accompanying illustration.

The type of this species was collected by R. M. Harley, S. J. Mayo, R. M. Storr, T. S. Santos, and R. S. Pinheiro (*no.* 19728) in a region of sandstone conglomerate, metamorphic, and quartzite rock outcrops with associated scrubby vegetation with damp flushes, grassland and marsh in some areas, at 1600--1850 m. altitude on the middle and upper slopes of the Pico das Almas, about 25 km. west-northwest of the Vila do Rio de Contas, approximately 41°57' W., 13°33' S., Serra das Almas, Bahia, Brazil, on March 19, 1977; this plant growing in the grassy marsh on the middle slopes of the Serra. The collectors note: "Silvery-grey rosette herb to ca. 35 cm. with dark sheaths and recurved leaves. Involucral bracts dark."

PAEPALANTHUS INOPINATUS Mold., sp. nov.

Plate 4

Herba rosulata; foliis caespitosis gramineis subcoriaceis 6--8 cm. longis 2--2.5 cm. latis rigidis pallide viridibus nitidis supra subglabris subtus puberulis marginaliter dense ciliatis apicaliter argutis; vaginis gracillimis arcte adpressis 6--7.5 cm. longis multistriatis ubique puberulis non tortis, apice fissis; pedunculis gracillimis flavidis 21--29 cm. longis subteretibus glabris non tortis; capitulis in statu alabastro parvis subrotundis ca. 4 mm. latis; bracteis involucrantibus ovatis brunneis apicaliter acutis extus puberulis.

A rosulate herb to about 30 cm. tall; leaves all basal, cespite, rigid, subcoriaceous, grass-like, pale-green, 6--8 cm. long, 2--2.5 mm. wide, shiny, subglabrous above, puberulent beneath, marginally densely and rather irregularly ciliate, the hairs longest toward the leaf-base. apically very sharp-pointed; sheaths very slender, closely appressed to the peduncle, 6--7.5 cm. long, longitudinally many-striate, not twisted, puberulent throughout, split apically; peduncles very slender, yellowish, usually 7 or 8 per plant, 21--29 cm. long, subterete, glabrous, not twisted; heads in bud small, subrotund, about 4 mm. wide; involucral bracts ovate, brown, apically acute, about 3 mm. long and 2 mm. wide, dorsally puberulent, marginally ciliolate; flowers not seen.

The type of this species was collected by R. M. Harley, S. J. Mayo, R. M. Storr, T. S. Santos, and R. S. Pinheiro (*Harley no.* 20130) in a region of rocky riverside with rapids, riverine vegetation, cerrado with sandstone outcrops and some grassland areas subject to flooding (but dry at time of collection), at an altitude of approximately 980 m., between 2.5 and 5 km. south of Vila do Rio de Contas on the side road to the west of the road to Livramento, leading to the Rio Brumado, approximately 41°50' W., 13°36' S., Serra do Rio de Contas, Bahia, Brazil, on March 28, 1988. The collectors note: "Herb to 20 cm. with rosette of rigid pale green leaves. Involucral bracts grey-black. Flowers white."

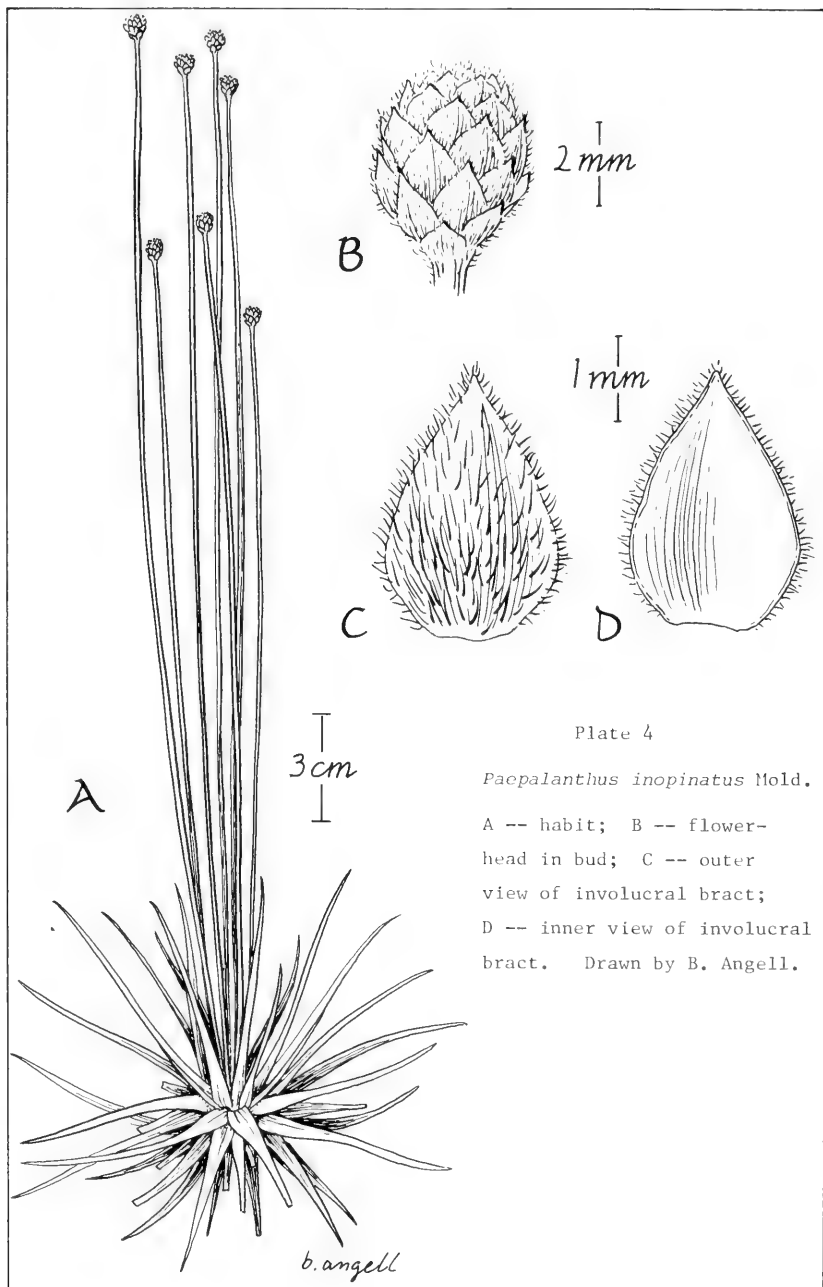


Plate 4

Paepalanthus inopinatus Mold.

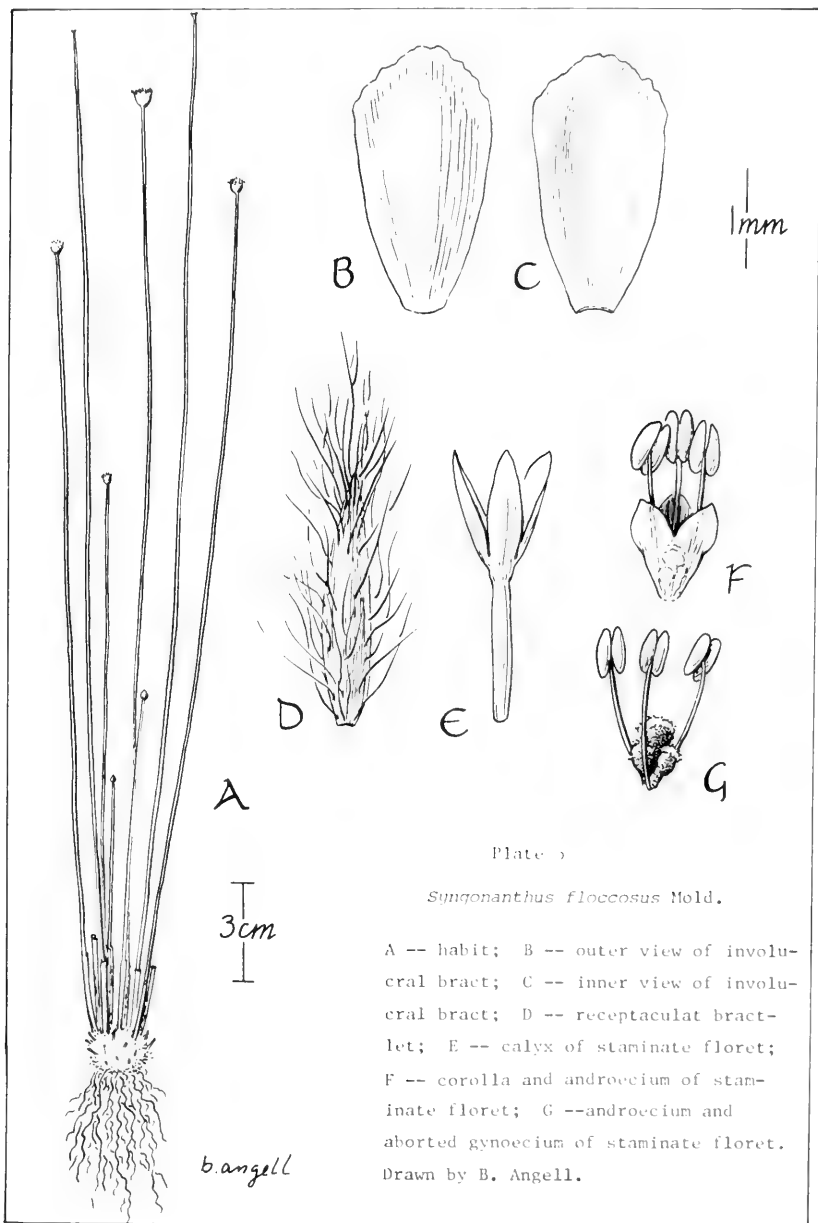
A -- habit; B -- flower-

head in bud; C -- outer

view of involucral bract;

D -- inner view of involucral

bract. Drawn by B. Angell.



SYNGONANTHUS FLOCCOSUS Mold.

Plate 5

Herba rosulata erecta ca. 30 cm. alta; foliis caespitosis linearibus usque ad 1 cm. longis in cumulo floccoso densissimo albedo omnino occultis; vaginis gracillimis, arcte adpressis 2 cm. longis densissime albo-strigosis; pedunculis gracillimis flavidis 13--29 cm. altis tricostatis paulo tortis glabris; capitulis ovato-rotundatis 7--9 mm. latis densissime albo-villosis.

A rosulate herb, erect, to about 30 cm. tall; leaves all basal, cespitose, linear, to about 1 mm. long, almost completely hidden by a dense white cottony or woolly cushion of hair; sheaths very slender, very closely appressed to the peduncle, 2 cm. long, very densely white-strigose with mostly reflexed hairs; peduncles very slender, yellowish, 13--29 cm. long, 3-costate and shallowly 3-sulcate, slightly twisted, mostly glabrous; heads ovate-rotund, small, 7--9 mm. wide, very densely white-villous; involucre bracts white, oblanceolate, about 3 mm. long and 2 mm. wide, apically rounded and erose, glabrous, the lowermost smaller; receptacular bractlets numerous, narrow-lanceolate, very densely long-villous with white hair; for staminate floret characters, see accompanying illustration; pistillate florets not seen.

The type of this species was collected by R. M. Harley, S. J. Mayo, R. M. Storr, T. S. Santos, and R. S. Pinheiro (*Harley no. 19042*) near São Inácio, at an altitude of about 500 m., in the Serra do Açurua, approximately 42°44' W., 11°07' S., Bahia, Brazil, on February 25, 1977. The collectors note: "Erect tufted herb to ca. 20--25 cm. with dense fibrous roots and swollen white woolly base. Stems and leaves erect grey. Heads and involucre bracts white."

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 ADDITIONAL NOTES ON THE GENUS *VITEX*. XVI

Harold N. Moldenke

VITEX Tourn.

Additional & emended bibliography: Roxb., Hort. Beng. 46 & 95. 1814; Roth, Nov. Pl. Sp., imp. 1, 316--317. 1821; Wall., Numer. List [47] & [48], nos. 1743--1760. 1829; Sweet, Hort. Brit., ed. 2, 416--418. 1830; Wall., Numer. List 86, nos. 1743/C--1755 (1831) and 215, nos. 6313 & 6314. 1832; Loud., Hort. Brit., ed. 2, 246 & 573. 1832; Piddington, Tab. View Gen. Char. Roxb. 106--107. 1836; G. Don in Sweet, Hort. Brit., ed. 3, 550--551 & 768. 1839; G. Don in Loud., Hort. Brit. Suppl. 2: 741. 1839; Jack, Calcut. Journ. Nat. Hist. 4: 40--42. 1843; G. Don in Loud., Hort. Brit. Suppl. [3]: 657 & 734. 1850; Beddome, Forest. Man. in Fl. Sylvat. S. India 2: clxxi. 1874; Kurz, Forest Fl. Brit. Burma 2: 252, 269--273, & 612. 1877; Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 159--160. 1880; Vidal y Soler, Sin. Fam. Gen. Pl. Leñ.

Filip. [Introd. Fl. For. Filip.] 1:201, 202, & 204--205 (1883) and 2 [Atlas]: 35--36, pl. 75, fig. A--C. 1883; C. B. Clarke in Hook. f., Fl. Brit. India 4: 583--588, 601, & 774. 1885; Vidal y Soler, Phan. Cuming. Philip. 15, 39, 44, 64, 134, & 135. 1885; Warb., Engl. Bot. Jahrb. 13: 428--429. 1891; Woodrow, Journ. Bomb. Nat. Hist. Soc. 5: 359. 1899; Gamble, Man. Indian Timb., ed. 2, imp. 1, 524 & 539--542. 1902; Talbot, Trees Bomb., ed. 2, 271. 1902; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 432--433. 1904; Dalla Torre, Just Bot. Jahresber. 39 (1): 1319. 1913; Wangerin, Justs Bot. Jahresber. 39 (1): 848. 1913; Gamble, Man. Indian Timb., ed. 2, imp. 2, 524 & 539--542. 1922; Chiov., Fl. Somala 63 & 65. 1929; Bedevian, Illust. Polyglot. Dict. 617. 1936; Ainslie, Imp. Forest. Inst. Oxford Univ. Paper 7: 89. 1937; Kadambi, Indian Forest. 76: 18--30, 69--82, & 121--132. 1950; Metcalfe & Chalk, Anat. Dicot. 2: 1031--1038, 1040, & 1041, fig. 247 B & 248 B & H. 1950; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 432--433. 1958; Novak, Vyssi Rostliny, ed. 1, 689, 696, 699, 929, & 990. 1961; Dalla Torre & Harms, Gen. Siphonog., imp. 3, 432--433. 1963; Neal, In Gard. Hawaii, ed. 2, 720, 721, & 727--730, fig. 277. 1965; Munir, Gard. Bull. Singapore 21: 334 & 337. 1966; Van Zindern Bakker, Palaeoecol. Afr. Surr. Isl. 3: 146. 1967; Boquiren, Mycologia 63: 954. 1971; Pierre-Noel, Nom. Polyglot. Pl. Hait. 471. 1971; Gamble, Man. Indian Timb., ed. 2, imp. 3, 524 & 539--542. 1972; Novak, Vyssi Rostliny, ed. 2, 2: 736, 737, 740, & 983. 1972; Roth, Nov. Pl. Sp., imp. 2, 316--317. 1975; Ortega U., Cienc. Naturaleza 17: 23. 1976; Chin, Gard. Bull. Singapore 30: 196. 1977; Arp, Trop. Gard. Gulf Coast 82. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40--42, 44, 47, 51--53. & 57. 1978; Wang, Act. Entomol. Sin. 21: 343--344. 1978; Hocking, Excerpt. Bot. A.33: 86 & 88. 1979; Lessani & Chariot-Panahi, Taxon 28: 636. 1979; Mold., Phytologia 44: 384--417, 474--498, 505, & 507--512. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 302. 1979; Wang, Biol. Abstr. 68: 4667. 1979; Wherry, Fogg, & Wahl, Atlas Fl. Penna. 303. 1979; Mold., Phytologia 45: 40 & 343--345. 1980.

Junell (1934) and Novak (1961) place this genus in the *Lamiaceae*, and Dr. Carl Epling, noted specialist in this family of plants, shortly before his death, indicated to me that he agreed with this disposition of it. Hutchinson obviously would not so regard it since it is a pre-eminently arborescent genus.

Vidal y Soler (1885) assert that *Cuming* 1173 consists of a mixture of a *Vitex* sp. and *Vitis cumingiana* Turcz. in the *Vitaceae*.

VITEX ACUMINATA R. Br.

Additional bibliography: Warb., Engl. Bot. Jahrb. 13: 429. 1891; Mold., Phytologia 44: 223--224. 1979.

VITEX AGNUS-CASTUS L.

Additional & emended bibliography: Metcalfe & Chalk, Anat. Dicot. 2: 1031 & 1033. 1950; Novak, Vyssi Rostliny, ed. 2, 2: 737, 740, & 983. 1972; Arp, Trop. Gard. Gulf Coast 82. 1978; Mukher-

jee & Chanda, Trans. Bose Res. Inst. 41: 53. 1978; Mold., Phytologia 44: 385. 1979; Wherry, Fogg, & Wahl, Atlas Fl. Penna. 303. 1979.

Recent collectors have found this plant growing on roadside banks (in Texas) as a 2--3-foot shrub with purple flowers in July. Wherry and his associates (1979) report it as adventive in Chester County, Pennsylvania

Additional citations: TEXAS: Travis Co.: *Correll & Correll* 34288 (N). RUSSIA: Turkanskaya: *Nitikin & Ivanov s.n.* [28.06. 1975] (N).

VITEX AGNUS-CASTUS var. *PSEUDO-NEGUNDO* Hausskn.

Additional bibliography: Lessari & Chariot-Panahi, Taxon 28: 636. 1979; Mold., Phytologia 44: 339 & 344--347. 1979.

Lessari & Chariot-Panahi (1979) report the chromosome number of this taxon as $2n = 32$ and cite as the basis of the report *Sanei 60877* from 1300 m. altitude in Iran.

VITEX ALTISSIMA L. f.

Additional bibliography: Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 160. 1880; E. D. Merr., Sp. Blanc. 333. 1918; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 52. 1978; Mold., Phytologia 44: 385 & 394. 1979.

VITEX ALTISSIMA f. *juv. ALATA* (Willd.) Mold.

Additional & emended bibliography: Roth, Nov. Pl. Sp., imp. 1, 316--317. 1821; Kurz, Forest Fl. Brit. Burma 2: 269, 272--273, & 612. 1877; Metcalfe & Chalk, Anat. Dicot. 2: 1036. 1950; Roth, Nov. Pl. Sp., imp. 2, 316--317. 1975; Mold., Phytologia 44: 385. 1979.

VITEX ALTISSIMA f. *SUBGLABRA* Thwaites

Additional bibliography: Mold., Phytologia 44: 354 & 358--360. 1979.

Additional citations: SRI LANKA: *Nooteboom & Huber 3162* (W--2819669).

VITEX AMBONIENSIS var. *SCHLECHTERI* Pieper

Additional & emended bibliography: Pieper, Engl. Bot. Jahrb. Beibl. 141: 69. 1928; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 403. 1938; H. N. & A. L. Mold., Pl. Life 2: 81. 1948; Mold., Phytologia 15: 89. 1967; Mold., Fifth Summ. 1: 252 (1971) and 2: 923. 1971.

VITEX APPUNI Mold.

Additional bibliography: López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 33. 1979; Mold., Phytologia 44: 386--387 & 399. 1979.

Recent collectors have found this plant in flower in April and report the vernacular name, "guarataro". The corollas are said to have been "blue" on the Aristeguieta collection cited below.

Additional citations: VENEZUELA: Guárico: *Aristeguieta 7025* (N).

VITEX BENTHAMIANA Domin

Additional bibliography: Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 160. 1880; K. Schum. & Hollr., Fl. Kais. Wilhelmsl. 121. 1889; Mold., Phytologia 44: 390. 1979.

VITEX BREVILABIATA Ducke

Additional bibliography: Mold., Phytologia 44: 392. 1979.

Prance and his associates describe this plant as a tree, 15 m. tall, the trunk to 25 cm. in diameter, and the corolla-tube light-purple, the upper 2 "petals" [lobes] white, the 3 lower blue, with yellow pubescence on the lower "petal" [lobe], and encountered it in a forest on terra firme, flowering in September. Their collection seems to represent a form with only 3 leaflets per leaf.

Additional citations: BRAZIL: Amazonas: Prance, Berg, Bisby, Steward, Monteiro, & Ramos 18027 (N).

VITEX CALOTHYRSA Sandw.

Additional bibliography: López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 33. 1979; Mold., Phytologia 44: 395. 1979.

VITEX CAPITATA Vahl

Additional synonymy: *Vitex capitata* Pers. ex G. Don in Loud., Hort. Brit. Suppl. [3]: 657. 1850.

Additional bibliography: G. Don in Loud., Hort. Brit. Suppl. [3]: 657. 1850; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 33. 1979; Mold., Phytologia 44: 387 & 396--399. 1979.

Recent collectors have found this plant growing at 30 m. altitude, in flower in April. The corollas are said to have been "blue" on *Aristeguieta* 5283.

Additional citations: VENEZUELA: Bolivar: *Aristeguieta* 5283 (N). Sucre: *Steyermark, Carreño Espinoza, & Manara* 107840 (N).

VITEX COFASSUS Reinw.

Additional bibliography: Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 160. 1880; Mold., Phytologia 44: 401--405. 1979.

Schumann & Hollrung (1889) cite only *Hollrung* 505. Schumann & Lauterbach (1900) cite *Hellwig* 196 & 446, *Hollrung* 505, and *Bamler* 97, all from New Guinea, flowering there from January to March. They record the vernacular name, "ganaula", and assert that the wood is used to make boat-rudders and in house construction there.

Canfield describes the species as a tree, 10 m. tall, the corollas "lavender" in color, and the fruit red to dark-blue, and encountered it as "occasional" in burned-over fields on volcanic clay soil, at 50 m. altitude, in flower and fruit in April, growing in association with *Pandanus*, *Macaranga*, *Scleria*, *Thelypteris*, and *Cordyline*.

Additional citations: PALAU ISLANDS: Koror: *Canfield* 739 (W--2881433); *Eumons* 21 (W--2881276).

VITEX COLUMBIENSIS Pittier

Additional bibliography: López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 33. 1979; Mold., *Phytologia* 44: 405--406. 1979.

VITEX COMPRESSA Turcz.

Additional bibliography: López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 33. 1979; Mold., *Phytologia* 44: 406--407 & 414. 1979.

Recent collectors refer to this plant as a tree, 12 m. tall, and have found it growing on rocky soil in mountain savanna forests and in high forests, at 473 m. altitude, flowering in April and December.

Additional citations: VENEZUELA: Bolívar: *Aristeguieta* 5215 (N). SURINAM: *Sang LBB.16266* (N).

VITEX COOPERI Standl.

Additional bibliography: Mold., *Phytologia* 44: 408--409. 1979.

Croat refers to this species as a tree, 12 m. tall, the corollas "blue", and the immature fruit green, and found it in flower and fruit in August.

Additional citations: HONDURAS: Atlántida: *Croat* 42679 (W--2846413). COSTA RICA: Heredia: *Hartshorn* 932 (Z).

VITEX CYMOSA Bert.

Additional bibliography: Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 40 & 52. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 33. 1979; Mold., *Phytologia* 44: 410--412, 485, & 492. 1979.

Beck describes this plant as a tree, 8--10 m. tall, and encountered it on wet savannas and in chaparral converted to cattle raising land, at 220 m. altitude; the corollas were "blue" on his no. 2559.

Additional citations: BOLIVIA: El Beni: *S. G. Beck* 2559 (Ld), 2559a (Ld).

VITEX DIVARICATA Sw.

Additional synonymy: *Vitex multiflora* Sw. ex Pierre-Noel, *Nom. Polyglot. Hait.* 471, in syn. 1971 [not *V. multiflora* Miq., 1844].

Additional bibliography: Pierre-Noel, *Nom. Polyglot. Pl. Hait.* 471. 1971; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 52. 1978; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 33. 1979; Mold., *Phytologia* 44: 409, 413--415, & 475. 1979.

Pierre-Noel (1971) lists the following vernacular names for this plant: "bois lézard", "fiddlewood", "black fiddlewood", "higüerillo", "bois d'agoutis", "manioc à goutis", "palo de pendulá", "pendulá", "pendulo blanco", "roble guayo", "roble de olor", "timber fiddlewood", and "totumillo".

VITEX DONIANA Sweet

Additional bibliography: G. Don in Loud., *Hort. Brit. Suppl.* [3]: 657. 1850; Ainslie, *Imp. Forest. Inst. Oxford Univ. Paper* 7: 89.

1937; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 52. 1978; Mold., Phytologia 44: 474--480. 1979.

VITEX DUCKEI Huber

Additional bibliography: Mold., Phytologia 44: 480--481. 1979.

Further study indicates that the *Ducke s.n.* [São Gabriel, Feb. 16, 1936; Herb. Rio de Janeiro 35667], cited by me as *V. duckei* in 1955, more likely represents *V. klugii* Mold.

VITEX EXCELSA Mold.

Additional bibliography: Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40. 1978; Mold., Phytologia 44: 482. 1979.

VITEX FLAVENS H.B.K.

Additional bibliography: Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 52. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 33. 1979; Mold., Phytologia 44: 484--485 & 492. 1979.

VITEX FLORIDULA Duchass. & Walp.

Additional bibliography: Pittier, Contrib. U. S. Nat. Herb. 20: 484. 1922; Mold., Phytologia 44: 485--486. 1979.

VITEX GARDNERIANA Schau.

Additional bibliography: Mold., Phytologia 44: 488--489. 1979; Rizzini, Trat. Fitogeog. Bras. 2: 302. 1979.

VITEX GIGANTEA H.B.K.

Additional bibliography: López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 33. 1979; Mold., Phytologia 44: 492--493. 1979.

VITEX GLABRATA R. Br.

Additional bibliography: Mold., Phytologia 44: 493--498. 1979.

It would appear that, in general, typical *V. glabrata* has the leaflets usually 3 in number, rounder, and more glabrate, and the corymbs fewer-flowered, loose, with dichotomous axillary cymes. In the very similar f. *bombacifolia* the leaflets are usually 5 in number, larger and broader -- well exemplified by "*Vitex n. 18*, Herb. Ind. or. H.f. & T." In f. *pallida* the leaflets are smaller, more hairy, and the peduncles shorter -- well exemplified by "*Vitex n. 10*, Herb. Ind. or. H.f. & T."

Clarke (1885) comments that "The typical *V. glabrata*.....has leaves usually 3-foliolate and rounder more glabrate leaflets and fewer-fld. corymbs than the Indian tree; but some of the examples of *V. Cunninghamii* appear identical with Silhet specimens. The typical *V. bombacifolia*, Wallich.....has the leaflets mostly 5, large and broad; *V. pallida*, Wallich.....has smaller, more hairy leaflets, and short peduncles."

VITEX GLABRATA f. *BOMBACIFOLIA* (Wall.) Mold.

Additional bibliography: Mold., Phytologia 44: 498. 1979.

Recent collectors describe this plant as a tree, 43 feet tall, the trunk 2 feet in girth at breast height, the wood hard and dur-

able, and have found the tree in flower in May. Griffith (1854) found it in cultivation at Mergui, in southern Burma, while Voigt (1845) reports it in cultivation at Calcutta, in West Bengal, India.

Griffith's *V. elegans* is based on a specimen "In horto meo, beato Mergui: March, 1835" and he provides a remarkably detailed description of the taxon. *Vitex bombacifolia* is based on Wallich 1749/1 cultivated in the Calcutta Botanical Garden, 1749/2 from Tagtomen on the Irawaddi River, collected in 1826, and possibly 1749/3 from Melhing. It should be noted in this connection that Wallich's no. 1749D [on p. 86 of his work] is identified as *V. leucoxydon* L. f., as are also nos. 1749E and 1749F.

The *Béjaud 519*, distributed as and previously cited by me as *f. bombacifolia*, actually represents var. *poilanei* Mold.

Additional citations: BURMA: Tenasserim: Helfer 6062 (Pd). BANGLADESH: Majumder & Islam MADw.24522 (Ws, Ws). CULTIVATED: India: Herb. Hort. Bot. Calcutt. s.n. (Pd).

VITEX GLABRATA f. *PALLIDA* (Wall.) Mold., Phytologia 44: 329. 1979.

Synonymy: *Vitex pallida* Wall., Numer. List [48], no. 1749, hyponym. 1829; C. B. Clarke in Hook. f., Fl. Brit. India 4: 588, in obs. 1885.

Bibliography: Wall., Numer. List [48], no. 1751. 1829; C. B. Clarke in Hook. f., Fl. Brit. India 4: 588. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1214. 1895; Mold., Prelim. Alph. List Inv. Names 51. 1940; Mold., Alph. List Inv. Names 54. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 1214 (1946) and imp. 3, 2: 1214. 1960; Mold., Résumé 387. 1969; Mold., Fifth Symm. 2: 725. 1971; Mold., Phytologia 44: 329. 1979.

Haec forma a forma typica speciei foliolis minoribus pubescentioribus pedunculis brevioribus recedit.

This form, characterized by its smaller more hairy leaflets and short peduncles, is typified by Wallich 1751 from Martaban in Lower Burma. Clarke (1885) asserts that it is well exemplified by "*Vitex n. 10*, Herb. Ind. or. H.f. & T."

VITEX GLABRATA var. *POILANEI* Mold.

Additional bibliography: Mold., Phytologia 15: 245. 1967; Mold., Fifth Summ. 1: 303 (1971) and 2: 925. 1971.

The *Béjaud 519*, cited below, has previously been regarded as typical *V. glabrata* R. Br. or as its *f. bombacifolia* (Wall.) Mold.

Additional citations: CAMBODIA: *Béjaud 519* (N).

VITEX GODERDZICA Tsagareli, Bull. Acad. Sci. Georgian SSR 78: 383--384. 1975.

Synonymy: *Vitex goderdzica* Tsagareli, Bull. Acad. Sci. Georgian SSR 78: [381], sphalm. 1975.

Bibliography: Tsagareli, Bull. Acad. Sci. Georgian SSR 78: 381-384. 1975; "H. R.". Biol. Abstr. 61: 2221. 1976; Anon., Biol. Ab-

str. 61: AC1.733. 1976.

Illustrations: Tsagareli, Bull. Acad. Sci. Georgian SSR 78: [381] & 382. 1975.

This fossil species has been described from the Goderdzi flora series, Miocene-Pliocene in age, of South Georgia, Russia. Its leaves closely resemble those of modern *V. negundo* var. *cannabifolia* (Sieb. & Zucc.) Hand.-Mazz. The author has also compared it with *V. pentamera* Engelhardt and *V. paucidenticulata* Kutuzkina.

VITEX GOLUNGENSIS J. G. Baker

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 317 & 330. 1900; Mold., Phytologia 15: 245. 1967; Mold., Fifth Summ. 1: 245 (1971) and 2: 716 & 925. 1971.

The type of this species, *Welwitsch 5635* in the British Museum herbarium was photographed there as F. G. Meyer photograph number 3889.

Additional citations: ANGOLA: Cuanza Norte: *Welwitsch 5635* [F. G. Meyer photo 3889] (Gz--type of type, N--photo of type).

VITEX GRANDIDIANA Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 404. 1938; H. N. & A. L. Mold., Pl. Life 2: 62. 1948; Mold., Phytologia 15: 245. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 925. 1971.

VITEX GRANDIDIANA var. *ANGUSTIFOLIA* Mold.

Additional bibliography: Mold., Phytologia 15: 245. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 925. 1971.

VITEX GRANDIFOLIA Gürke, Engl. Bot. Jahrb. 18: 169--170. 1894.

Additional synonymy: *Vitex grandifoliola* Gürke ex Adam, Bull. Inst. Fond. Afr. Noire A.32: 1005 & 1018. 1970. *Vitex grandifolia* "Gürke ex Engl." ex Mold., Fifth Summ. 2: 718, in syn. 1971.

Additional & emended bibliography: Gürke, Engl. Bot. Jahrb. 18: 169--170. 1894; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 316 & 324. 1900; A. Chev., Vég. Util. Afr. Trop. Franç. 9: 280--281 & 340--343. 1917; Dalla Torre, Justs Bot. Jahresber. 40 (2): 781. 1917; Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 1, 276--277. 1931; Ainslie, Imp. Forest. Inst. Oxford Univ. Inst. Paper 7: 89. 1937; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 403. 1938; Roberty, Pét. Fl. Ouest-Afric. 178--179. 1954; S. & G. Mangelot, Bull. Jard. Bot. Brux. 27: 653. 1957; Irvine, Woody Pl. Ghana 763. 1961; Adjanohoun, Veget. Act. Geobot. 11: 21, 29, & 35, fig. 33. 1962; Gledhill, Check List Flow. Pl. Sierra Leone 30. 1962; Huber in Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 2, 445--448. 1963; Grout de Beaufort & Schnell, Contrib. Etud. Pl. Myrmecod. [Mem. Inst. Fond. Afr. Noire 75:] 45--47, pl. 10, fig. D--G. 1966; Mold., Phytologia 16: 502. 1968; Mold., Résumé Suppl. 17: 12. 1968; Bolkhov., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 1, 717. 1969; Adam, Bull. Inst. Fond. Afr. Noire

A.32: 1005 & 1018. 1970; Hartwell, Lloydia 34: 388. 1971; Mold., Fifth Summ. 1: 217--221, 223--225, & 374 (1971) and 2: 713, 714, 716, 718, 721, & 925. 1971; Den Outer, Meded. Landbouwhogs. 72-20: 7 & 51. 1972; Farnsworth, Pharmacog. Titles 7 (4): xxvi & 222. 1972; Townsend, Kew Bull. 27: 147--148. 1972; Bolkhov., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 2, 717. 1974; [Farnsworth], Pharmacog. Titles 7, Cum. Gen. Ind. [118]. 1975; Jaeger & Mold., Phytologia 30: 403. 1975; Mold., Phytologia 44: 479. 1979.

Additional illustrations: Adjanohoun, Veget. Act. Geobot. 11: 21, fig. 33. 1962; Grout de Beaufort & Schnell, Mem. Inst. Fond. Afr. Noire 75: 47, pl. 10, fig. D--G. 1966.

This species was originally based on *Mann 880* and *Soyaux 215*, as cotypes, not on *Zenker 959* as is sometimes stated. Recent collectors describe the plant as an erect shrub or treelet, 4--5 m. tall, the leaves usually 5-foliolate, opposite, exstipulate, the petioles about 12 cm. long, the leaflets obovate, the middle ones usually 13--40 cm. long and 6--20 cm. wide, apically abruptly acuminate, marginally entire, basally gradually very long-cuneate, the petiolules about 1 cm. long, and the fruit globose, yellow, and edible. The chromosome number is reported as being $2n = 32$. Irvine claims that the species is "common" in deciduous and secondary forests in Ghana. It has recently been collected in flower in January and in fruit in February. The corollas are said by Den Outer (1972) to be yellow. Vernacular names reported for the species are "awama.owama", "bicona", and "evous". Dalla Torre (1917) reports that the leaflets may be galled by a gall-wasp.

Adjanohoun (1962) asserts that *V. grandifolia* grows in association with *Loudetia ambiens* in Ivory Coast. Jaeger & Moldenke (1975) report it from gallery forests at 375 m. altitude in association with *Ficus otoniifolia*, *Xylopia parviflora*, *Pachystela brevipes*, *Baissea zygodoides*, *Aphanostylis mannii*, *Phyllanthus* sp., *Hibiscus comoensis*, *Psychotria calva*, and *Hypolytrum heteromorphum*. Irvine (1930), using the incorrect name, *Vitex grandiflora* Gürke, claims that it is conspecific with *V. cuneata* [now known as *V. doniana* Sweet], citing only *Irvine 89* from Ghana. Hutchinson & Dalziel (1936) describe *V. grandifolia* as "A small tree with glabrous branchlets and subcoriaceous 5-foliolate leaves; flowers 1/2 in. long silky outside, yellowish with brown-purple tips; habitat secondary forest. Casamance and French Guinea to S. Nigeria and Cameroons! Extending to Gabon." Dalziel (1937) states that "The plum-like fruits are yellow when ripe, but later turn black; they have a thin edible pulp and are used at various parts of the coast [of west tropical Africa] to make a spirit said to taste like rum. They are also used like those of *V. Cienkowski* [now called *V. doniana*] to make a sweetmeat. The sapwood is white, the heart darkening to brown, more open-grained than teak, finishing smoothly, said to be durable and termite-proof. Large drums are made from it in S. Nigeria, and the smaller stems are used for house-building. In Sierra Leone the wood is sometimes burned for potash." Hartwell (1971)

reports that the leaves and bark are powdered and mixed with oil and then used by the natives of Nigeria in the treatment of tumors. Chevalier (1917) describes the species as an "Arbre de 25 à 30 mètres de hant, à tronc de 0 m. 60 à 0 m. 90 de diamètre, long de 15 à 20 mètres sans rameaux. Bois blanc grisâtre, avec de jolis reflets, se travaillant bien. Aubier et coeur non différenciés. D. pour 26611 = 0,497 - D. pour 26621 = 0,528. Écorce cendré roussâtre, très pâle, finement écaillée à la surface, un peu rugueuse, épaisse de 3 à 4 mm....Ce bois est susceptible de remplacer le noyer gris. On l'exporte de la Setté-Cama en Europe.....Peu commun dans la forêt."

Ainslie (1937), in his discussion of *V. grandifolia*, which he calls by the vernacular name of "ori", says that "The bark decoctions of most *Vitex* spp. are used as a stomachic. The root-infusion is a febrifuge. The bark and leaf are powdered and applied to sores, and, mixed with oil, applied to tumours and other swellings. The leaf-decoction is used as a mouth-wash, and the leaf-fomentation in rheumatism, orchitis, &c. The infusion of leaf, bark and root is used for bad toothache, neuralgia, rheumatism and fever. The boiled fruit of *V. cuneata* is drunk as a tea and is said to be very refreshing and to have tonic properties."

Grout de Beaufort & Schnell (1966) describe the myrmecophily of this species: "Dans les spécimens observés (Benoit 132, Cameroun; Chevalier 26621, 33158, 33298, Cameroun) les orifices sont nets, parfois invisibles de l'extérieur, parfois entièrement percés jusqu'à la surface. Ces pores sont soit aux noeuds, soit sur la ligne médiane des entre-noeuds. Il peut aussi exister, en ligne sur l'entre-noeud, des cicatrices non perforées".

Hutchinson & Dalziel (1936) cite Barter 354, 2098, & 2180, Chevalier 14799, 15470, 16508, 17107, 17275, 19091, 19790, & 19819, Dalziel 1247, Farquhar 12, Mann 880, Millen 32, Murphy 676, Rowland s.n., Rumsey 14, Scott Elliot 4327, Talbot 2057, Unwin 47, Vigne 1041, and Winkler 1165 from west tropical Africa. Irvine (1961) cites from Ghana: Green 898, Irvine 89, 1810, & 2208, Kitson 1182, Lyon 2723 & 2869, Murphy 676, Rumsey 14, and Vigne 1041. Fedde & Schuster (1938) cite Buesgen 72a, Ledermann 1135, Mildbraed 5658, Staudt 136, Tessmann B.193, Winkler 1165, Zahn 504, and Zenker 959, 1351, 1893, 1915, 1915a, & 2164 from Cameroons as *V. grandifolia* var. *bipindensis* (Gürke) Pieper.

Material of *V. grandifolia* has been misidentified and distributed in some herbaria as *V. doniana* Sweet, *V. micrantha* Gürke, and *V. "micranthus" Gürke*. On the other hand, the Baldwin 10989, distributed as *V. grandifolia*, actually is *V. doniana* Sweet, while Zenker 2909 is *V. rivularis* Gürke.

Additional citations: REPUBLIC OF GUINEA: Jacques-Georges 27873 (Mu). LIBERIA: Baldwin 10989 (N); Straub 207 (W--946144). IVORY COAST: Bernardi 8159 (E--1828000, Mu, W--2631913). GHANA: Vigne 1041 (W--1526146). CAMEROONS: Zenker 959 (Mu--1830), 1451 (Mu--3713), 1893 (Mu--3773), 1915 (Mu--3772), 1915a (Mu--3775), 2164 (Mu--3911), s.n. [Kamerun] (W--719282).

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 316 & 325. 1900; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Mold., Phytologia 15: 246--247. 1967; Mold., Fifth Summ. 1: 238 & 245 (1971) and 2: 716, 719, & 925. 1971.

Baker (1900) cites only the type collection, *Welwitsch 5759*, from Huíla, Angola, photographed in the British Museum herbarium as Missouri Botanical Garden type photograph number 2997.

Additional citations: ANGOLA: Huíla: *Welwitsch 5759* (Mu--photo of type, W--photo of type).

VITEX GRISEA var. *DEKINDTIANA* (Gurke) Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; H. N. & A. L. Mold., Pl. Life 2: 55. 1948; Mold., Phytologia 15: 247. 1967; Mold., Fifth Summ. 1: 245 (1971) and 2: 716 & 925. 1971.

VITEX GUERKEANA Hiern

Additional bibliography: Good & Exell, Journ. Bot. Lond. 68: Suppl. 144. 1930; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; H. N. & A. L. Mold., Pl. Life 2: 62. 1948; Mold., Phytologia 16: 502 (1968) and 17: 36. 1968; Mold., Fifth Summ. 1: 245 (1971) and 2: 717, 727, & 925. 1971.

This species is based on *Welwitsch 5632* from Angola, and the type was photographed in the British Museum herbarium as Missouri Botanical Garden type photograph number 2995.

Additional citations: ANGOLA: Cuanza Norte: *Welwitsch 5632* [Mo. Bot. Gard. photo 2995] (Mu--photo of type, W--photo of type).

VITEX GUERKEANA var. *GOSSWEILERI* Pieper

Additional bibliography: Good & Exell, Journ. Bot. Lond. 68: Suppl. 144. 1930; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; H. N. & A. L. Mold., Pl. Life 2: 62. 1948; Mold., Phytologia 15: 247. 1967; Mold., Fifth Summ. 1: 245 (1971) and 2: 716 & 925. 1971.

VITEX GUIANENSIS Mold.

Additional bibliography: Mold., Phytologia 15: 247. 1967; Mold., Fifth Summ. 1: 131 (1971) and 2: 925. 1971.

VITEX HARVEYANA H. H. W. Pearson

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 63. 1948; Mold., Phytologia 16: 502. 1968; Mold., Résumé Suppl. 16: 8. 1968; Van der Schijff, Check List Vasc. Pl. Kruger Natl. Park 81. 1969; Mold., Fifth Summ. 1: 249, 252, 255, & 257 (1971) and 2: 727 & 925. 1971; Palmer & Pitman, Trees South. Afr., ed. 2, 3: 1950, 1952, & 1955. 1972; Mold., Phytologia 44: 329 & 492. 1979. Illustrations: Palmer & Pitman, Trees South. Afr., ed. 2, 3: 1952. 1972.

Palmer & Pitman (1972) reduce *V. geminata* H. H. W. Pearson and *V. schlechteri* Gürke to synonymy here, stating that the latter is said to differ in having its "leaves in whorls of 3 and with un-

toothed leaflets". They assert that *V. harveyana*, in this broad sense, is a dense bushy or scrambling shrub, sometimes with long trailing branches, or a small tree, of the eastern Transvaal low veld, of Zululand, Swaziland, and of northeastern Namibia, "growing in dense bush, sometimes in rocky soil and often along the banks of streams.....The small, silky, oblong buds open into flowers that are white, blue or violet, sometimes 2-toned, and fragrant. They usually bloom from October to December...The fruit, ripe from February to May, is round or somewhat oblong, about 1.3 cm long, with a slightly enlarged calyx. It is said to be edible, but whether by humans is debatable....The specific name commemorates William Henry Harvey, F.R.S., (1811--1866), distinguished Irish algologist and botanist, who was Colonial Treasurer at the Cape of Good Hope and later Professor of Botany at Trinity College, Dublin. He published the first Genera of South African Plants at Cape Town in 1838, and was joint author of volumes 1--3, *Flora Capensis*, 1859--1865."

Recent collectors describe *V. harveyana* as a woody bush, small shrub, or climber, to 8 feet tall, or as a tree to 20 feet tall, and have found it growing on steep wooded slopes, rocky outcrops, and riverbanks, at 500 feet altitude, flowering in November and fruiting in April. The corollas are said to have been "blue" on Moll & Strey 3703 and "purple" on Wells 2173.

Van der Schijff (1969) cites his nos. 873, 1762, 2496, 2586, & 3986, as well as Acocks 16733 and Codd 5114 & 5242, all from Kruger National Park.

Additional citations: SOUTH AFRICA: Natal: Haygarth 7462 (W--550083); Moll & Strey 3703 (W--2559160); Wells 2173 (Mu). Transvaal: Dahlstrand 813 (Go); Rodin 4232 (Ba, W--2063132).

VITEX HARVEYANA f. *GEMINATA* (H. H. W. Pearson) Mold., *Phytologia* 44: 329. 1979.

Synonymy: *Vitex geminata* H. H. W. Pearson in Thiselt.-Dyer, Fl. Cap. 5: 213--214. 1901.

Bibliography: H. H. W. Pearson in Thiselt.-Dyer, Fl. Cap. 5: 213--214. 1901; Prain, Ind. Kew. Suppl. 3: 189. 1908; Pieper, Engl. Bot. Jahrb. 62, Beibl. 141 ["142"]: 56 & 82. 1928; Mold., known Geogr. Distrib. Verbenac., ed. 1, 52 & 103 (1942) and ed. 2, 122 & 201. 1949; Mold., *Phytologia* 5: 373 (1956) and 6: 23. 1957; Mold., *Résumé* 154 & 476. 1959; Mold., *Phytologia* 15: 112 & 255. 1967; Mold., Fifth Summ. 1: 257 (1971) and 2: 925. 1971; Palmer & Pitman, Trees South. Afr. 3: 1951 & 1953. 1972; Mold., *Phytologia* 44: 329 & 492. 1979.

Palmer & Pitman (1972) regard *V. geminata* as a synonym of typical *V. harveyana* H. H. W. Pearson, but in typical *V. harveyana* the leaves are decussate-opposite and the leaflets marginally dentate, while in f. *geminata* the leaves are ternate and the leaflets marginally entire.

The type of the form is Gerrard & McKen 2027, collected along the Umlatusi River in Zululand.

VITEX HAUSKNECHTII Bornm.

Additional bibliography: Bornm., Fl. Nord Syr. [Notizbl. Bot. Gart. Berlin 7:] 25. 1917; H. N. & A. L. Mold., Pl. Life 2: 63. 1948; Parsa, Fl. Iran 4 (1): 540. 1949; Mold., Phytologia 15: 248. 1967; Mold., Fifth Summ. 1: 266 (1971) and 2: 710, 711, 718, & 925. 1971; Mold., Phytologia 25: 244. 1973.

Parsa (1949) says of this species: "Inflorescence plus maigre; branches minces, allongées; calice petit; corolle non exserte; limbe petit; lèvres infér. barbue".

VITEX HAVILANDII Ridl., Kew Bull. Misc. Inf. 1929: 262. 1929.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 404. 1938; H. N. & A. L. Mold., Pl. Life 2: 63. 1948; Mold., Phytologia 15: 248. 1967; Mold., Fifth Summ. 1: 328 (1971) and 2: 925. 1971.

This species is based on *Haviland 861* from Sarawak. Ridley (1929) notes that this species is "allied to *V. tetragona* H. Hal-lier [now known as *Teijsmanniodendron sarawakanum* (H. H. W. Pearson) Kosterm.] which I know only from the description, but the leaves are smaller, not acute at the base nor chartaceous; the calyx is not pubescent and the corolla much smaller."

The *Agama 575*, distributed as *V. havilandii* and so cited by me in a previous installment of these notes, proves actually to be *Teijsmanniodendron smilacifolium* (H. H. W. Pearson) Kosterm.

VITEX HAYNGA Roxb.

Additional bibliography: Voigt, Hort. Suburb. Calc. 469. 1845; C. B. Clarke in Hook. f., Fl. Brit. India 4: 588. 1885; Mold., Phytologia 15: 248. 1967; Mold., Fifth Summ. 1: 279 (1971) and 2: 925 & 970. 1971.

Voigt (1845) lists this plant as cultivated in the Calcutta area. Clarke (1885) comments that it "is probably one of the species described in Fl. Ind., under which Roxburgh has omitted to record the earlier name".

VITEX HEMSLEYI Briq.

Additional & emended bibliography: Sessé & Moc., Pl. Nov. Hisp., ed. 2, 96. 1893; Pittier, Contrib. U. S. Nat. Herb. 20: 483 & 485--486. 1922; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1076. 1932; H. N. & A. L. Mold., Pl. Life 2: 63. 1948; Rzedowski & Mc Vaugh, Contrib. Univ. Mich. Herb. 9: 20 & 107. 1966; Mold., Phytologia 16: 502. 1968; Gibson, Fieldiana Bot. 24 (9): 236. 1970; Mold., Fifth Summ. 1: 77 & 470 (1971) and 2: 715, 720, 724, 767, 768, & 925. 1971; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 112. 1975; Mold., Phytologia 34: 252 (1976) and 44: 491. 1979.

Sessé & Mocino's description of *Cornutia pentaphylla* is "*Cornutia foliis quinatis, foliolis lanceolatis.....Arbor quinque orgyas longa. Rami oppositi, tuberculis gemmaceis scabri. Folia opposita, quinata; foliolis lanceolatis, integerrimis, glabris. Racemi corymbosi, ex superioribus foliorum axillis. Bracteae lineares. Flores coerulei, odoratissimi. Stylus vix staminibus longior. Habitat in calidis Novae Hispaniae regionibus. Floret Maio. h*"

Recent collectors describe this species as a small spreading

tree, 5 m. tall, and have found it growing on sea cliffs and in tropical subdeciduous forests, from near sealevel to 750 m. altitudes, flowering in May and June, fruiting in July. The corollas are said to have been "blue and sage-like" on Clark 7188.

The *Harmon 2481*, distributed as *V. hemsleyi*, actually is *Vitex kuylenii* Standl., while *R. V. Moran 10159* and *Ventura A. 2469* are *V. pyramidata* B. L. Robinson.

Additional citations: MEXICO: Guerrero: *O. M. Clark 7188* (E--1287868); *Hinton 10189* (Ld). Jalisco: *Delgado S. 351* [R. Hernández 2600] (Mi); *Pérez & Hernández 859 bis* (N). Michoacán: *J. Espinosa 835* (Ws), *860* (Ws); *Hinton 13789* (Se--117455, Tu--112021).

VITEX HENRYI Mold.

Additional bibliography: Mold., *Phytologia* 15: 248. 1967; Mold., *Fifth Summ.* 1: 290 (1971) and 2: 925. 1971.

VITEX HEPTAPHYLLA A. L. Juss.

Additional & emended bibliography: D. Dietr., *Syn. Pl.* 3: 611. 1843; Buek, *Gen. Spec. Syn. Candoll.* 3: 501 & 502. 1858; Alain in León & Alain, *Fl. Cuba*, imp. 1, 4: 317 & 318, fig. 137. 1957; Mold., *Phytologia* 16: 502 (1968) and 17: 17, 22, & 23. 1968; Mold., *Fifth Summ.* 1: 98 (1970) and 2: 713, 718, 721, 730, & 925. 1971; Alain in León & Alain, *Fl. Cuba*, imp. 2, 2: 317 & 318, fig. 137. 1974; Mold., *Phytologia* 44: 391. 1979.

Additional & emended illustrations: Alain in León & Alain, *Fl. Cuba*, imp. 1, 317, fig. 137 (1957) and imp. 2, 2: 317, fig. 137. 1974.

Recent collectors describe this plant as a shrub, treelet, or small tree, 5--10 m. tall, the branches spreading, forming a crown, the leaves 3--7-foliolate, and the fruit drupaceous, yellow. They have found it growing in serpentine soil, at altitudes of 100--300 m., flowering in April and May, fruiting in June and July. The Liogiers refer to it as "common on riverbanks" and "common in thickets and woods on serpentine barrens". The corollas are said to have been "blue" on Alain & Jiménez 5680, Jiménez 6172, and Liogier 11479 & 14876.

It should be noted that the *Vitex arborea* accredited to Bréon in the synonymy of *V. heptaphylla* actually is a synonym of *V. beraviensis* var. *acuminata* Mold., while that ascribed to Roxburgh is *V. pinnata* L. and that credited to Desfontaines and to Fischer is *V. negundo* f. *albiflora* Mold.

Additional citations: HISPANIOLA: Dominican Republic: Alain & Jiménez 5680 (W--2577007A); Ekman H.11292 (Ld), H.12643 (Ld); J. J. Jiménez 6172 (N); Jiménez & Liogier 5680 (N); A. Liogier 11265 (Ld, N), 11479 (Ld, N), 14876 (Ld, N), 15717 (N, W--2576808A); Liogier & Jiménez 5680 (Ld); Liogier & Liogier 19340 (N, N); Val-
eur 936 (Ld), 972 (Ld, Ld), 1031 (Ld). Haiti: Ekman H.3988 (Ld).

VITEX HIRSUTISSIMA J. G. Baker

Additional bibliography: Mold., *Phytologia* 15: 248--249. 1967; Mold., *Fifth Summ.* 1: 263 (1971) and 2: 925. 1971; Capuron, *Adansonia*, ser. 2, 12: 51. 1972

VITEX HOCKEI DeWild.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 42: 252. 1920; Mold., Phytologia 15: 249. 1967; Mold., Fifth Summ. 1: 232, 238, & 245 (1971) and 2: 716, 727, & 925. 1971.

Recent collectors describe this plant as a shrub, 4 m. tall, and have encountered it on herbaceous savannas, fruiting in April.

Additional citations: ZAIRE: *Callens* 3072 (N), 3300 (N).

VITEX HOLOADENON Dop

Additional synonymy: *Vitex holaodenon* Dop apud Fedde & Schust., Justs Bot. Jahresber. 56 (2): 286, sphalm. 1937.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 56 (2): 286. 1937; Mold., Phytologia 15: 249. 1967; Mold., Fifth Summ. 1: 303 (1971) and 2: 719 & 925. 1971.

VITEX HOLOCALYX J. G. Baker

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 316 & 322--323. 1900; Good & Exell, Journ. Bot. Lond. 68: Suppl. 144. 1930; Mold., Phytologia 15: 249. 1967; Mold., Fifth Summ. 1: 245 (1971) and 2: 722 & 925. 1971.

Baker (1900) cites only the type collection, *Welwitsch* 5636, from Angola. Good & Exell (1930) cite *Welwitsch* 5863, also from Angola.

VITEX HORNEI Hemsl.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 45 (1): 149. 1923; Mold., Phytologia 15: 249. 1967; Mold., Fifth Summ. 1: 259 (1971) and 2: 728 & 925. 1971.

VITEX HUMBERTI Mold.

Additional bibliography: Mold., Phytologia 15: 249. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 719 & 925. 1971.

VITEX HUMBERTI var. *ANGUSTATA* Mold.

Additional bibliography: Mold., Phytologia 15: 249. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 925. 1971.

VITEX HYPOLEUCA Schau.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 502. 1858; Mold., Phytologia 15: 249--250. 1967; Mold., Fifth Summ. 1: 179 (1971) and 2: 714, 719, & 925. 1971; Rizzini, Trat. Fitogeog. Bras. 2: 302. 1979.

Belém & Mendes describe this species as a tree, 2 m. tall, the corollas "red", and the immature fruit green in January.

The *Carrick* & *Enoch* JC.255, distributed as *V. hypoleuca*, actually is *V. trifolia* var. *bicolor* (Willd.) Mold.

Additional citations: BRAZIL: Bahia: *Belém* & *Mendes* 297 (N).

VITEX IBARENSIS J. G. Baker

Additional bibliography: Mold., Phytologia 15: 250. 1967; Mold., Fifth Summ. 1: 263 (1971) and 2: 925. 1971.

VITEX IMPRESSINERVIS Mildbr.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Mold., Phytologia 15: 250. 1967; Mold., Fifth Summ. 1: 224 (1971) and 2: 925. 1971.

VITEX INTEGRIFOLIA Urb.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1077. 1932; Ciferri, Mycopath. 7: 89. 1954; Hansford, Sydowia, ser. 2, Beih. 2: 684. 1961; Mold., Phytologia 15: 250. 1967; Mold., Fifth Summ. 1: 105 (1971) and 2: 925. 1971.

Ciferri (1954) records the fungus, *Irenopsis aciculosa* var. *viticis* (Rehm.) Stev. [*Meliola aciculosa* var. *viticis* Rehm.], from *Vitex integrifolia* on the basis of Ekman 4174 from Hispaniola.

Additional citations: HISPANIOLA: Dominican Republic: Ekman H. 14882 (Ld).

VITEX IRAQUENSIS Mold.

Synonymy: *Vitex iraquensis* Mold. apud Patzak & Rech., Fl. Iran. 43: 6. 1967.

Additional bibliography: Parzak & Rech. in Rech., Fl. Iran. 43: 5, 6, & 8. 1967; Mold., Phytologia 15: 250. 1967; Mold., Fifth Summ. 1: 267 (1971) and 2: 719 & 926. 1971; Townsend, Kew Bull. 27: 147--148. 1972; Anon., Biol. Abstr. 56 (4): B.A.S.I.C. S.198 & S.280. 1973.

Townsend (1972) is of the opinion that this species cannot possibly be native to Iraq and that the type specimen could not possibly have been collected by Lazar. The type, however, could not be matched in the genus *Vitex* from any part of the world in the Kew herbarium and so "It may well be that *V. iraquensis* will prove to be a good species from the tropics with an exceedingly unfortunate specific epithet."

VITEX IRINGENSIS Gürke

Additional bibliography: Mold., Phytologia 15: 250. 1967; Mold., Fifth Summ. 1: 238 (1971) and 2: 926. 1971.

VITEX ISOTJENSIS Gibbs

Synonymy: *Vitex isotjensis* Moore ex Mold., Fifth Summ. 1: 719, in syn. 1971. *Vitex isotyensis* Gibbs, in herb.

Additional bibliography: Mold., Phytologia 15: 250. 1967; Mold., Fifth Summ. 1: 247 (1971) and 2: 926. 1971.

The type of this species, Gibbs 236, was photographed in the British Museum herbarium as Missouri Botanical Garden photograph A,859.

Additional citations: ZAMBIA: Gibbs 236 [Mo. Bot. Gard. photo A.859] (Gz--photo of type, N--photo of type). ZIMBABWE: Guy s.n. [Herb. Rhodes. 85928] (Mu).

VITEX KAPIRENSIS DeWild.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 42: 252. 1920; Mold., Phytologia 15: 250--251. 1967; Mold., Fifth

Summ. 1: 232 (1971) and 2: 926. 1971.

VITEX KENIENSIS Turrill

Synonymy: *Vitex kewensis* L. H. & E. Z. Bailey, Hortus Third 1162, in syn. 1976.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 43: 159. 1922; Wangerin, Justs Bot. Jahresber. 56 (1): 669. 1936; Metcalfe & Chalk, Anat. Dicot. 2: 1036, fig. 248 B. 1950; Dale, Descrip. List Introd. Trees Uganda 70 & 72. 1953; Dale & Greenway, Kenya Trees Shrubs 592, 595, & 596, fig. 109, photo 79 & 80. 1961; Mound, Proc. Ent. Soc. Lond. (A) 38: 178. 1963; Van Zinderen Bakker, Palaeoecol. Afr. Surr. Isl. 3: 146. 1967; Mold., Phytologia 16: 502. 1968; Gillett, Numb. Check-list Trees Kenya 47. 1970; Fogg, Newslet. Arb. Barnes Found. 6: 8. 1971; Blasco, Inst. Franç. Pond. Trav. Sec. Scient. Tech. 10: 291 & 426. 1971; Mold., Fifth Summ. 1: 238, 242, & 374 (1971) and 2: 926. 1971; L. H. & E. Z. Bailey, Hortus Third 1162. 1976; Mound & Halsey, Whitefly World 123. 1978; Mold., Phytologia 44: 389. 1979.

Additional illustrations: Metcalfe & Chalk, Anat. Dicot. 2: 1036, fig. 248 B. 1950; Dale & Greenway, Kenya Trees Shrubs 596, fig/ 109, photo 79 & 80. 1961.

Recent collectors describe this plant as a fast-growing timber tree, growing 6 feet per year, attaining a height of up to 160 feet and a trunk girth of 24 1/2 feet, the bark corrugated, the sap colorless, the "leaves in groups of five" [*i.e.*, 5-foliolate], the petioles pubescent, the flowers aromatic, and the fruit edible, and have encountered it in thick forests on "red fossil sandy laterized soil", at 3900 feet altitude, flowering in November. The corollas are said to have been "white" on *Tanner 1119*. Vernacular names reported for the species are "meru oak", "moru", "mouru", "muhuru", and "muuru".

Dale (1953) asserts that "except in the habit of growth it is very difficult to distinguish [this tree] from the indigenous *V. fischeri* Gürke. Tanner reports the fruit "used to add flavor to tobacco snuff" in Tanzania. Dale & Greenway (1961) describe the species as a "Forest tree to 100 ft. with 50 ft. of clear bole: and 6 ft. diam. (usually 3 ft.): Bark thin, rough and slightly fissured: blaze creamy yellow turning dirty green. In its leaves and flowers the species is scarcely distinguishable from *V. fischeri*. Timber pale grey-brown, coarse textured with well-marked growth zones and often with a wavy grain figure: seasons, works and nails well; strength varies with weight (25--37 lb. per cu. ft. air dry) but approximates to that of *Podo*; not durable in the ground. The heart of older trees is often piped; the heartwood has an attractive dark colour. Common in east Mt. Kenya forests; 5,000--6,000 ft. Collections from elsewhere are referable to *V. fischeri* Gürke, and it is doubtful if *V. keniensis* is distinct from that species." Mound (1963) reports that *V. keniensis* is often host to the whitefly, *Bemisia tabaci* (Gennadies) Takahashi.

The *Tanner R.T.2523*, distributed as *V. keniensis*, seems actually to be *V. payos* (Lour.) Merr.

Additional citations: TANZANIA: Tanganyika: *Tanner 1119* (N). KENYA: *Honore 660* (W--1716685).

VITEX KLUGII Mold.

Additional bibliography: Macbr., *Field Mus. Publ. Bot.* 13 (5): 692 & 695. 1960; Mold., *Phytologia* 15: 251. 1967; Mold., *Fifth Summ.* 1: 121, 128, 144, & 179 (1971) and 2: 713, 729, & 926. 1971; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 15: 100, fig. [19]. 1975; Soukup, *Biota* 11: 20. 1976; López-Palacios, *Fl. Venez. Verb.* 582, 610--614, & 654, fig. 142. 1977; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 33. 1979.

Illustrations: López-Palacios, *Revist. Fac. Farm. Univ. Andes* 15: fig. [19]. 1975; López-Palacios, *Fl. Venez. Verb.* [611], fig. 142. 1977.

López-Palacios (1975) comments that "Este *V.* es bastante similar a *V. triflora*, pero sus flores son muy pequeñas y las cimas divaricadas y no 3-floras. Está restringido a la Hilea amazónica. Para Venezuela sólo existe un registro: *Maguire & alt.* 42575 del Cerro de la Neblina, T. F. Amazonas".

In a personal communication to me he lists the vernacular name, "maporí", from Colombia; others have recorded "conejenumo" and "pale de hambre".

Recent collectors describe the species as a small tree, 8--15 m. tall, the trunk 10--35 cm. in diameter at breast height, and have found it growing in forests on terra firme and in lateritic soil of primary forests, as well as on sandy riverbanks, at 120 m. altitude, in flower from September to December and in February. The corollas are said to have been "bluish" on *Liesner 4100*, "violet-blue" on *Ducke s.n.*, "blue with one white lobe" on *Prance & al.* 15004, and "tube blue, largest lobe blue, the other lobes white or white with blue patches" on *Prance & al.* 23050. *Liesner* reports that the species is used as an appetite stimulant for children.

Castañeda comments that "Eje de la inflorescencia y pedúnculo verdes. Cáliz verde pálido. Tubo de la corola morado-lila en la base y blanco el resto; los 2 pétalos laterales tienen el envés blanco y la haz morado-lila; 2 labios inferiores blancos en ambas caras; pétalo mayor morado-lila en ambas caras. Filamentos didínamos, exsertos, morado-lila. Ovario verde pálido, globoso."

López-Palacios (1977) cites only the type collection, *Klug 625*, from Peru, and *Maguire & al.* 42575 from Amazonas, Venezuela; in his 1979 work he cites *Romero Castañeda 3769* from Vaupés, Colombia.

The *Ducke* collection cited below was previously cited by me as *V. duckei* Huber and may prove to represent a natural hybrid between these two species. Its leaf characters appear to be intermediate.

Additional citations: COLOMBIA: Vaupés: *Romero-Castañeda 3769* (N, N, N). VENEZUELA: Amazonas: *Liesner 4100* (Ld). BRAZIL: Amazonas: *Ducke s.n.* [São Gabriel, Feb. 16, 1936; Herb. Rio Jan. 35667] (N); *Prance, Coelho, & Monteiro 15004* (Ld, N); *Prance, Pennington, Leppard, Monteiro, & Ramos 23050* (Ld, N).

[to be continued]

TWO PENSTEMONS OF BAJA CALIFORNIA, MEXICO—ONE NEW, ONE USED
(Scrophulariaceae)

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Among the fruits of many botanical trips in Baja California are various doubtful specimens, put aside for a time when there might be more time and then almost forgotten when there wasn't. Now the need for a name prompts me to take time for two neglected species.

Penstemon angelicus (I.M. Johnston) Moran, comb. & stat. nov.
P. clevelandii var. angelicus I.M. Johnston, Proc. Calif. Acad.
Sci. iv. 12:1165. 1924.
P. clevelandii ssp. angelicus Keck, Amer. Midl. Naturalist
18:811. 1937.

Short-lived perennial, sometimes flowering first year, glabrous except for pedicels and flowers, the herbage somewhat grayish glaucous. Stems solitary or few from slightly woody base, virgate, 5-14 dm tall, to 2.5 cm thick at base, pale green, with ca. 15-35 nodes below inflorescence. Leaves all distinct, more crowded below, from irregularly dentate below to entire above; lower narrowly petiolate, 3-8 (-10) cm long, the blade ovate, acute to obtuse, 2-5 cm long, 1-3 cm wide, the petiole 1-3 cm long; few to several middle ones broadly petiolate, 4-8 (-12) cm long, 2-4 (-6) cm wide, elliptic to obovate, acute, narrowing gradually into petiole-like base 1-4 cm long and 2-12 mm wide; upper sessile, subcordate, triangular-ovate or narrowly so, acute, 4-7 (-8) cm long, 2-4 (-5) cm wide, the uppermost reduced and relatively narrower. Thyse subracemose, 1-6 dm long, 3-5 cm wide, of ca. 5-25 nodes; peduncles erect or ascending, mostly 1-3 mm long, the lower in large inflorescences sometimes longer, in fruit even to 10 mm; cymes mostly 3-8 flowered; pedicels erect or ascending, glabrous to somewhat glandular-puberulent, 2-7 mm long in flower, to 12 (-18) mm long in fruit. Sepals purplish, ovate to mostly lanceolate or elliptic, acute, glabrous to glandular-puberulent, 3-6 mm long, 1.5-3 mm wide. Corolla scarlet, glandular-puberulent within and without, tubular-funnelform, bilabiate, 15-21 mm long, 5-8 mm wide at throat and 10-15 mm wide at apex (pressed), the tube slightly ascending, 3-5 mm long, 2-4 mm wide (pressed), the throat horizontal, rather abruptly ventricose anteriorly, straight posteriorly, in cross-section flat above and rounded below and ca. 4 mm high and 5 mm wide, the upper lip erect, 5-7 mm high, its segments rounded, 3-5 mm long, the lower lip deflexed, 6-9 mm long, its segments rounded, 4-6 mm long. Filaments

glabrous, the lower 10-12 mm long, adnate 2.5-3 mm, broadened at base, the upper 8-9 mm long, adnate 0.5-1 mm, with thickened ovate base ca. 1.5 mm wide; anther sacs explanate, ovate, glabrous, 1.5-1.9 mm long. Staminode 8-10 mm long, adnate 2-3 mm, glabrous, cuneately broadened to ca. 1 mm at apex. Ovary 2-3 mm long, the style 5-7 mm long. Capsules triangular-ovoid, brown, 7-12 mm long. Chromosomes: $2n=16$.

Type: Sheltered ledge of a basaltic cliff about 3 km from shore, in a short gorge-like constriction of Palm Canyon, Isla Angel de la Guarda, Baja California Norte, Mexico, 3 May 1921, Ivan M. Johnston 3413 (CAS 1304). To judge from Johnston's map, this is near 29°09'N, 113°13'W.

Distribution: Known only from Isla Angel de la Guarda, where it is occasional or locally common on slopes and especially in arroyo beds at 15 to 1080 m elevation in the northern to south-central part of the island. Collections: Hastings 71-12 (ARIZ, SD); Moran 7182, 7187, 8580, 12896, 12930, 23951 (SD and to go).

For one collection (M8580) Peter Raven got a chromosome count of $2n=16$, as reported also (by Keck and others) for most other counted diploid species of Penstemon, including P. clevelandii.

Until recently P. angelicus has been known only from the very incomplete type collection, with no flowers except a few dried ones found on the ground. Keck (1937) and Wiggins (1964), with no new material, followed Johnston in subordinating it to P. clevelandii. Later collections add several distinctive characters to those already known or suspected.

Penstemon angelicus is taller (5-14 dm) than P. clevelandii (3-7 dm). The transition from narrowly petiolate lower leaves to subcordate sessile upper ones is not abrupt but gradual on the taller stem of P. angelicus, with several broadly petiolate middle leaves. The inflorescence is sub-racemose, the peduncles greatly reduced as compared to those of P. clevelandii. The corolla is not crimson to purplish red but scarlet, with no trace of blue pigment. The corolla differs further in being a little shorter, relatively broader, and more markedly bilabiate; and the tube is much shorter and is more abruptly broadened to the throat. The staminode and stamens are much shorter and so do not closely approach the mouth of the corolla; and (in relation to the shorter tube) the staminode and lower stamens are inserted much closer to the corolla base. Thus P. angelicus differs rather sharply from P. clevelandii in several respects.

Because of its dentate leaves and ventricose corolla, P. angelicus seems best kept in subsection Spectabiles of section Peltanthera, where it becomes the only species with scarlet flowers. There is no other species to which it is obviously closest but perhaps none to which it seems closer than to P. clevelandii.

Penstemon vizcainensis Moran, spec. nov.

Herba biennis vel temporibus minus aridis saepe longius vivens, 1-2.5 m alta, praeter bracteolas ciliatas florasque glandulosas glabra. Folia viridia lanceolata usque 16 cm longa, inferioribus petiolatis denticulatis, superioribus sessilibus, supremis angustioribus integris. Thyrsus virgatus 4-15 dm altus 2-5 cm latus; sepala 4-5 mm longa sparse glanduloso-ciliata; corolla rosea infundibularis bilabiata sparsim glanduloso-puberulenta 18-22 mm longa; stamina glabra, antheris explanatis inclusis, staminodio glabro sparse barbato. Typus: Moran & Reveal 19938 (SD 92631). Species P. florida Brandege ut videtur proxima, quae autem 6-12 dm tantum alta est, foliis glaucis grossius denticulatis, inflorescentia glandulosa, corollae 22-30 mm longae.

Short-lived perennial, glabrous below inflorescence, the second year with single terminal flowering stem, in dry years often dying monocarpic, otherwise in next years with several stems from near base and then becoming bushy. Stems virgate, 1-2.5 m tall, to 2.5 cm thick at base, light green, after flowering dying mostly to lower fourth or below, with ca. 20-25 nodes below inflorescence, the lower crowded, the upper 6-10 cm long. Leaves bright green, lanceolate to oblong, to 16 cm long and 3.3 cm wide, the lower petiolate, acute to obtuse, cuneate at base, irregularly denticulate, with petioles to 3 cm, the middle sessile, acute, denticulate, the upper smaller and especially narrower, entire. Inflorescence a virgate thyrsus 4-15 dm high, 2-5 cm wide, of 12-30 internodes, the middle and lower 2-8 cm long, the upper shorter; peduncles closely ascending, 2-6 mm long; cymules of 1-3 (-10) flowers; bractlets narrowly lanceolate, acute, sparsely glandular-ciliate, ca. 5 mm long; pedicels ascending, 4-15 mm long. Sepals imbricate, lanceolate to ovate, acute to acuminate, 4-5 mm long, 1-3 mm wide, sparsely glandular-ciliate above. Corolla horizontal, deep pink to rose-purple, funnellform, bilabiate, 18-22 mm long, 8-10 mm wide at throat and to 17 mm wide at apex (pressed), sparsely glandular-puberulent without and in distal half within with trichomes mostly ca. 0.1 (-0.2) mm long, the tube ca. 3-4 mm long but indefinite, gradually ampliate into ventricose throat, the upper lip erect, ca. 5 mm long, the segments ca. 3 mm long, the lower lip ca. 6 mm long, the segments ovate, obtuse, 4-5 mm long and wide. Filaments glabrous, the lower 17-20 mm long, slightly broadened at base, adnate ca. 3 mm, the upper 15-18 mm long, with ovate basal thickening ca. 2 mm wide, nearly free;

anther sacs explanate, oval, ca. 2.4-2.7 mm wide, glabrous. Staminate node 13-16 mm long, adnate less than 1 mm, thickened in lower 4 mm, slightly spatulate-broadened at apex, glabrous or sparsely bearded with to ca. 10 trichomes ca. 1 mm long within 3 mm of apex on posterior side. Ovary triangular-ovoid, very sparsely glandular, 4-5 mm high, tapering into style 10-15 mm long. Capsule ovoid, brown, 8-10 mm long. Seeds black, angular, ca. 1.5 mm long.

Type: Steep north slope, bank of Arroyo Largo 16 km east of the mouth, Vizcaino Peninsula, Baja California Sur, Mexico (near 27°37'N, 114°40'W), elevation ca. 340 m, 8 February 1973, Reid Moran and James L. Reveal 19938; holotype: SD 92631; isotypes to go (BM, CAS, MEXU, MO, NY, US).

Distribution: Known only from arroyos near the type locality. Other collections: bed of Arroyo Largo 4 km from mouth, 40 m, Moran 22769 (SD), 11 km from mouth, 150 m, Moran 28084 (SD), 14.5 km from mouth, 270 m, Moran 28083 (SD and to go); gravelly arroyo bed [Arroyo de las Casitas] 12.4 km west of San José de Castro, 300 m, Betty Mackintosh in 1969 (SD); arroyo bed 4.5 km west of San José de Castro, 350 m, Moran 28082 (SD).

The new species fits well in subsection Spectabiles of section Peltanthera (Keck 1937). It is remarkable for its height (1-2.5 m), equalled in the section only in P. eximius Keck (rarely to 2.8 m). It appears closest to P. floridus Brandege, of east-central California and adjacent Nevada, and especially to the narrower-flowered southern subsp. austiniae (Eastw.) Keck. However, P. floridus is a shorter plant (6-12 dm), with glaucous and more coarsely dentate leaves, a glandular inflorescence, and longer corollas (22-30 mm); and the filaments of the shorter pair are somewhat viscid-puberulent at the base. The two members of this subsection closest geographically to P. vizcainensis are P. clevelandii A. Gray, extending from southern California to Comodú, central Baja California, and P. eximius Keck, from the eastside canyons of the Sierra Juárez to Volcán las Tres Vírgenes, Baja California. Penstemon clevelandii is a much shorter plant (3-7 dm), with relatively wider leaves and with a narrower, more nearly regular, crimson to purplish red corolla. Penstemon eximius has coarsely dentate leaves and a glandular inflorescence, and the corolla is white to pale pink with darker guidelines, is much larger (25-35 or even 45 mm long and 15-25 mm wide pressed), expands more abruptly from a shorter tube, and has the lower lip bearded. Also close geographically is P. angelicus (I.M.Jtn.) Moran, fully described above.

The Vizcaino area has little rainfall and in some years none. A 12-year mean for Bahía Tortugas was 95.8 mm and a 10-year mean for Vizcaino 79.8 mm (Hastings & Humphrey 1969). No data are published for years since 1969.

In February 1969 Mrs. Mackintosh saw old stems of Penstemon several places but saw only one plant in flower. Her photograph shows this an old fruiting plant with stem still green, with some original leaves, and with two short flowering branches near the middle. Out of focus in the background are several seedlings and several old fruiting plants apparently dead in the upper half or more but with new axillary shoots below. At the type locality in February 1973, a season of moderate to high rainfall for the area, we found many seedlings and many old fruiting plants unbranched below the inflorescence and apparently dead and thus monocarpic. We found only one plant in flower, with several flowering branches from the base--perhaps a third-year plant, the only survivor of its generation. If so, we saw no plants that started the year before--suggesting that may have been a drought year. In December 1975, following more than a year of drought according to a local rancher, I found no seedlings but saw many old fruiting plants with new shoots near the base. In February 1980 I saw a few seedlings and only a dozen old plants the length of Arroyo Largo, all alive but none flowering.

These scattered observations suggest that drought years see few or no seedlings, so that a whole generation may have to wait; that plants flower the second year, then die nearly to the base; that many plants make further growth the third year even in drought years and will flower the third year and later if rainfall is adequate; but that many plants die after flowering once.

The many old stems seen in 1973, and likewise in 1975, told of very good flowering the year before. Only two plants were found flowering in the four years when collections were made, but possibly others flowered later in some of these years. Other years, such as 1979, appear to have had few plants flowering. Some plants grow on the bank and many in the bed of the arroyo. Even when not flowering, they are conspicuous by their height. It is noteworthy that they were found different places in different years.

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New Combinations in the genus Aphanostephus (Astereae - Asteraceae)

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To accommodate the nomenclatural needs of several workers concerned with floristic studies in Mexico, the following new combinations within Aphanostephus are proposed:

1. A. ramosissimus DC. var. humilis (Benth.) Turner & Birdsong, comb. nov. Based upon Leucopsidium humile Benth., *Plantae Hartwegianae* p. 18. 1839. (= Aphanostephus humilis [Benth.] A. Gray).

This is the large headed, more western, variety which Shinnars (1946, in a revisional treatment, *Wrightia* 1:95-121.) treated as two species, A. humilis (type from Guanajuato, Mexico) and A. arizonicus (type from Gila Valley, Arizona). The smaller-headed, typical variety ramosissimus occurs primarily in the northeastern portions of Tamaulipas, Nuevo Leon and Coahuila Mexico, extending northward to Oklahoma. There is an extensive region of intergradation between the two taxa, as noted by Shinnars in his revision. Subsequent field work throughout the regions concerned strongly suggest that only a single species with intergrading regional populations exist. As treated by us, the variety also includes A. jaliscensis Shinnars.

2. A. ramosissimus var. ramosus (DC.) Turner & Birdsong, comb. nov. Based upon Keerlia ramosa DC., *Prodr.* 5:310. 1836. (= Aphanostephus ramosus [DC.] A. Gray).

This is the more tuberous-rooted, more montane, variety which occurs in southcentral Mexico. It includes A. pachyrrhizus Shinnars. Several workers, including Shinnars have described the roots as perennial, but it appears to be only facultatively so. Examination of plants in the field shows this to be a variable character, some plants appearing annual, some perhaps biennial (thickened tap roots) and some which might be construed as short-lived perennial. The taxon intergrades northward into the variety humilis.

A general treatment of the four species which comprise the genus Aphanostephus will be forthcoming shortly.

BOOK REVIEW

Alma L. Moldenke

"PLACE-NAMES OF NEW SOUTH WALES - Their Origins and Meanings" by A. W. Reed, ii & 156 pp. A. H. & A. W. Reed, Sydney, Melbourne, Wellington, Auckland; distributed in the United States by Charles E. Tuttle Co., Inc., Rutland, Vermont 05701. 1969. \$5.50.

Such little books as this give not only dictionary-type information but also charming tidbits for casual reading about 2,000 localities. The place names here have been derived in all of the usual ways, as, for instance, for people (Caley Hill for George Caley, botanist and explorer) and for conspicuous plants of the area (Belar for the forest oak, Condong for one of the sandpaper figs, *Ficus stephanocarpa*, whose leaves were used to polish spear-shafts, and Buondong for a native peach tree).

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Publication dates

- Volume 44, No. 6 --- December 6, 1979
 Volume 44, No. 7 --- December 17, 1979
 Volume 45, No. 1 --- February 7, 1980
 Volume 45, No. 2 --- February 19, 1980
 Volume 45, No. 3 --- March 6, 1980
 Volume 45, No. 4 --- March 20, 1980
 Volume 45, No. 5 --- April 7, 1980

New York Botanical Garden Library



3 5185 00216 0743



